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THE

Practical Medicine Series

COMPRISING TEN VOLUMES ON THE YEAR'S PROGRESS IN MEDICINE AND SURGERY.

UNDER THE GENERAL EDITORIAL CHARGE OF

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VOLUME VIII.

MATERIA MEDICA AND THERAPEUTICS
PREVENTIVE MEDICINE
CLIMATOLOGY

EDITED BY

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(The Therapeutic Agents Are Arranged Alphabetically.)

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EDITORIAL NOTE.

While there has been no exceptional advance in Therapeutics during the past year, save in the wonderful results of Ehrlich's investigations in experimental therapy, it is gratifying to note the rapid progress in therapeutics generally.

There is unquestionably a revival of interest in drug therapy, more consideration being given to drugs and preparations of greater simplicity, purity and accuracy. The active principles of vegetable drugs are slowly but surely supplanting the crude, galenical preparations. What I said in an editorial note some four years ago is now generally accepted as truth, namely: "There is a widespread demand for more simplification and precision in our armamentarium. * * * Precision can be founded only on precision; delicate accuracy in work requires delicate accuracy in tools."

Serums and vaccines are still found to be of value, but only in a comparatively few diseases; they have their limitations and are by no means "cure-alls," as many physicians once believed them to be. The various forms of physical therapy are being studied more carefully and in consequence are taking a more secure and respected position.

Therapeutics has recently received a wonderful impetus through the discovery of Ehrlich's dioxydiamidoarsenobenzol, the seeming specific against syphilis and the recurrent fever produced by the *Spirillum Obermaieri*. The clinical work done with this new remedy will be watched with the keenest interest by every physician. The results thus far tend to strengthen the hope that in "606" we have at last a true specific for syphilis and probably for many parasyphilitic affections.

Save now and then a new and genuine therapeutic discovery, such as this one of Professor Ehrlich's, there is but very little that can be called new or original as evi-

denced by the furore raised as to the value of tincture of iodin and epsom salts as surgical antiseptics and antiphlogistics. Yet, after all, the revival of an old, though valuable remedy or therapeutic measure is better than absolute indifference; it shows progress. We are progressing, I am glad to say, and Therapeutics is unmistakably "coming into its own."

GEORGE F. BUTLER.

MATERIA MEDICA AND THERAPEUTICS.

ACETANILID.

Acetanilid and Caffein. Hale[1] says that he found by experimentation on the hearts of both warm- and cold-blooded animals, that caffein is of little or no benefit in acetanilid poisoning, in so far as heart energy is concerned, and in some cases apparently exerts a harmful effect. The same is true also of the blood-pressure. On the other hand there appears, especially in the dog, to be a well-established antagonism as regards heart-rate. This antagonism, however, would probably be insufficient to be of any value in cases of poisoning in man. Feeding experiments demonstrated the absence of antagonism between acetanilid and caffein, the addition of the latter drug even in a small dose causing death more quickly than acetanilid uncombined. This, in connection with the imperfect antagonism as to the heart's action, makes the use of caffein in acetanilid mixtures especially questionable. Sodium bicarbonate, in contrast, lessens the toxicity of acetanilid both in its action on the heart and on the intact animal, increasing the duration of life, or making the use of a larger dose of acetanilid necessary to cause death.

ADRENALIN.

Action on the Skin. G. Sardou[2] discusses the remarkable benefits to be derived from painting the skin with adrenalin. His results are based upon 54 cases during the last six years. Among the conditions treated were toxic erythema, urticaria, acne, sunburn, bee-sting, eczema, pruritus, nevus, contusion, inflamed chilblains, headache, congestion of the face from indigestion, sciatica without neuritis, arthralgia, arthritis, varices, etc. The

(1) Jour. Pharm. and Exp. Therap., 1909.
(2) Ann. Gen. de Mé., Paris, February, 1909.

acts on the vessels in the region. Durable vaso-constriction is obtained by a moderate, graduated application of the adrenalin, renewed according to the effects produced. Too large a dose, at first, paralyzes the reaction. Hemorrhoids are benefited when moderate and recent unless they are the result of portal hypertension. The remedy may also fail on account of sclerosis and paresis of the walls of the vessels. The effects of the adrenalin are similar to those of constriction hyperemia. When applied locally, it re-enforces the local defenses without waiting for general reactions, the outcome of which it is impossible to foresee. Adrenalin is able to act in the depths of the tissues, and to aid their defensive efforts, or it may arouse them to more effective resistance.

Adrenalin in Hemorrhage. C. J. Wiggers[3] has performed a number of experiments with this drug, and has arrived at the following conclusions:

1. Large doses of adrenalin (0.05 to 0.1 mg.) cause a short preliminary increase in hemorrhage, followed quickly by a decrease or cessation of bleeding. On account of the great preliminary loss of blood, they are always contra-indicated.

2. Small doses of adrenalin (0.01-0.025 mg.) cause little or no preliminary increase, but shorten the course of hemorrhage. As they save the red blood cells in every way, they are therapeutically desirable.

3. The method of introducing adrenalin determines the effect of blood-pressure and hemorrhage. The subcutaneous administration does not give any results. A slight elevation of pressure and a simultaneous checking of the hemorrhage can be obtained by continuous intravenous injections of weak solutions. This may also be accomplished by intramuscular injections.

4. Adrenalin is not indicated in all intestinal hemorrhages. The condition of the blood-pressure is the criterion for its use. In hemorrhages of short duration when the pressure has not fallen to any extent, a judicious use of nitrites proves of more benefit than adrenalin. When the bleeding has been profuse, however, and a low pressure already exists, it becomes vital that hemorrhage should be

(3) Archiv. Int. Med., March 15, 1909.

checked without further reduction of pressure. Adrenalin is then very useful.

5. The use of adrenalin should always be followed closely by blood-pressure observations. The pressure should be estimated carefully after a dose below the safety limit has been tried. If no rise occurs, gradually increasing doses may be injected until a slight elevation of pressure is present, in which case we may be certain that enough has been introduced to effect hemorrhage.

Adrenalin in Uterine Hemorrhage. Grasser[4] states that for several years he has been in the habit of injecting adrenalin into the uterine cervix in cases in which there was bleeding after abortion with retention of the placenta. He believes that the method is safe and efficacious and prompt in its influence. Two to three drops of adrenalin solution mixed with 1 cc. of physiologic salt solution is injected. Of course careful asepsis must be maintained. In giving the injection, it is best to use a Sims speculum. If results are not prompt the injection may be repeated in a few minutes.

The same author[5] says that he has been using adrenalin for three years as a preliminary to clearing out the uterus after abortion when there is reason to anticipate much hemorrhage. He injects directly into the vaginal portion of the uterus 1 cc. of physiologic salt solution or of a 1 per cent. solution of cocain, to which two or three drops of a 1 per thousand solution of adrenalin have been added. The fluid is injected at two points, 1 or 2 cm. deep, and after waiting for ten minutes the curetting may proceed. He has never witnessed any injurious effect from the adrenalin in this concentration, while the saving of blood has been remarkable and there has been no tendency to after-hemorrhage.

An anonymous writer[6] relates two fatalities following the injection of adrenalin into the vaginal portion of the uterus. The first patient was a woman of 47 with total prolapse of the uterus, the vaginal portion of which was much hypertrophied. Under chloroform the fluid, consisting of 1 cc. of adrenalin solution in 10 cc. of 0.8 per cent. salt solution, was injected at three points when sud-

(4) Zentralbl. f. Gynäk., Nov. 25, 1909.
(5) Zentralbl. f. Chir., June 19, 1909.
(6) Zentralbl. f. Gynäk., June 19, 1909.

denly retching occurred, respiration and pulse stopped, and it proved impossible to revive the patient. Ten days later the same syndrome with instant death occurred in a similar case, the patient being a robust woman of 33 with a hemorrhagic metritis and fibrous hypertrophy of the neck of the uterus requiring wedge resection. Some of the fluid used was injected into rabbits but showed no injurious by-effects. The dose was very small in these cases, not more than 0.0003 gm. of active adrenalin, while twice the amount was injected in more than 50 other cases without mishap.

Adrenalin as a Styptic in Ophthalmic and Nasal Operations. McFarlane,[7] in writing on the use of a adrenalin in operation on the eye, ear and throat, says that adrenalin has been used with unfailing satisfaction pro viding care was taken not to use the solution in too great strength, pain being occasionally noted in the nose and face when 1:1,000 was painted upon the turbinals; and in 3 cataract extractions it seemed to cause a profuse hemorrhage from the iris when iridectomy was done, which may have been only a co-incidence.

In 50 cases of conjunctival injection, from causes varying in nature from simple congestion due to eye-strain to the most severe types of conjunctivitis, a single drop of adrenalin chlorid solution, 1:5,000, in the conjunctival sac almost immediately caused a blanching of the membrane, commencing in about ten seconds, and reaching a maximum in from five to ten minutes, the effect lasting from half an hour to two hours, according to the nature of the case. The blanching effect may be obtained by even a solution of from 1:12,000 to 1:10,000 in from thirty seconds to two minutes. For practical purposes a solution of 1:2,000 was found to give the best results in operative work upon the eye, causing no irritation that could be noted on close observation. A 2 per cent. solution of cocain hydrochlorid was used ten minutes prior to the instillation of the adrenalin, when operation was contemplated, in order that the effect of the anesthetic might not be interfered with, thus insuring a painless and almost bloodless result.

In 10 strabismus operations, and one advancement of

(7) Canadian Practitioner, June, 1909.

the internal rectus muscle, two drops of a 1:1,000 solution rendered the various procedures almost bloodless fifteen minutes after being dropped on the conjunctiva, a deep as well as superficial hemostatic action resulting. In an operation at St. Michael's Hospital for the removal of an eye, not more than ten drops of blood was lost, and this after five drops of a 1:1,000 of adrenalin chlorid was placed in the conjunctival sac, ten minutes prior to chloroform anesthesia. The effect seemed to extend to the central artery of the optic nerve, thus proving the rapid absorption of the active principle with control of the deep as well as superficial circulation of the parts. In diseases of the eye with a tendency to iritis or choroidal disease, where an astringent is contra-indicated, and in corneal ulceration, adrenalin should not be used; but, whenever an operation is required adrenalin will be found to be an invaluable adjunct.

It is in operations on the nose, throat and ear, that the specific action of the active principle of the suprarenal gland proves its great value as a hemostatic, the tendency to hemorrhage, controllable with difficulty, being one of the drawbacks of the surgery of these organs. For a number of years the writer has used with great satisfaction various solutions of the suprarenal extract in the removal of septal spurs, cartilaginous outgrowths, septal deviations, and hypertrophy of the turbinates, the only drawback being the difficulty of preparing fresh solutions, and the danger of irritation which so frequently existed. This, however, has been overcome, adrenalin giving better results without the concomitant disadvantages. The strength used was 1:2,000, applied by means of a cotton carrier, after local anesthesia had been accomplished by a 2 per cent. cocain solution. In this manner a number of large spurs and cartilaginous growths were removed with scarcely any hemorrhage. In addition to the hemostatic action, the contractile power of the drug upon the turbinate tissues greatly enlarges the field of vision for exploratory and operative measures.

For the removal of adenoid vegetations, the vault of the pharynx is sprayed with a 1:5,000 solution of adrenalin with 5 per cent. of chloreton, the result being all that could be desired. Except in the case of very small chil-

dren the writer never uses a general anesthetic, thus obviating one of the grave dangers attending these operations, the obtunding action of the chloreton being quite sufficient in the majority of cases to render them practically painless. Cocain is occasionally used in 3 per cent. solution, applied by a swab to the pharyngeal vault when the patient is over twelve years of age.

In hay-fever, the treatment of which has been so unsatisfactory, good results have been obtained by a spray of suprarenal extract to the nose, together with the administration of *pil. anti-neuralgic* (Brown-Séquard), one-half strength, thrice daily; and the use of sodium salicylate grs. v., potassium bicarbonate grs. xx., in aqua mentha piperita, t. i. d. Adrenalin being so much better than the old suprarenal extract, the writer feels confident of the results which will be obtained from its use during the hay-fever season.

In tonsillotomy the gland is to be painted by a solution of 1:1,000 of the adrenalin chlorid; or a 1:5,000 solution may be injected into the tonsil, which renders its removal almost bloodless. In cautery operations on the tonsil, the gland melts away like cheese, no hemorrhage interfering with the heating of the point of the instrument, a fact greatly appreciated.

As to drawbacks to the use of suprarenal gland extract, a certain amount of controversy has existed as to the greatest danger of secondary hemorrhage after its use, some eminent observers holding that such exists, and others claiming never to have noted it. In the writer's opinion, the great law of action and reaction holds good, and a slight tendency to after-hemorrhage exists undoubtedly; but it is not in any sense dangerous, and can be combated with unusual success if the cut surfaces are swabbed with a solution of equal parts of glycerin and alcohol. It is important to apply the adrenalin solution only to the part to be operated on, thus limiting its action. During the past three years 6 cases have been treated in hay-fever patients where a severe pain behind the eyes with uncomfortable sneezing came on after the suprarenal extract had been used in spray form. But adrenalin in normal saline solution is almost without irritation, according to the experience of the writer.

Adrenalin in Shock and Allied States. Neineke[8] reports the results of his experimental and clinical research, which demonstrate, he thinks, that the main effect of the infusion of adrenalin is due to the salt solution, and that this is more prominent in the cases in which the patient has just lost large amounts of fluid. The effect of the adrenalin is so transient that it can be of little use in peritonitis. Its chief field is in collapse, transient in its nature, as in general and spinal anesthesia; in shock after severe operations and injuries; in hemorrhage; and possibly also in intoxications and in threatening conditions during infectious diseases.

Adrenalin in Bubonic Plague. E. N. Thornton,[9] reports his experience with the 50 cases of the plague, of which 15 were fatal. For adults thirty minims of a 1:1,000 solution of adrenalin were given, at first usually by the mouth, with ten minims of tincture of strophanthus every four hours for the first three days and three times daily for the following fourteen days. Later, if the patient was very ill, the adrenalin was given hypodermically or intravenously in somewhat smaller doses. The mixture for oral administration was made up freshly as required. In the worst bubonic cases, it was customary to commence with an injection of twenty minims of the adrenalin chlorid in the neighborhood of the buboes, especially where the latter were unusually painful, or where much extravasation was occurring into the surrounding tissues. In general, the hospital mortality from the lesion (excluding septicemic cases) in those cases not treated with adrenalin has been 37.4 per cent., as compared with a mortality of only 26 per cent., among those treated with adrenalin. This lower mortality does not appear to have been due to the fact that the adrenalin patients had the disease in an unusually mild form; for, if anything, they appeared to be somewhat worse than were the majority of cases under treatment, especially those toward the middle and end of the series. Autopsy showed in nearly all the cases in which the remedy has been employed and failed, a marked diminution in the usual congestion of the organs,—no hemorrhages or petechiæ, less effusion into the pleuræ

(8) Archiv. f. klin. Chir., Sept. 4, 1909.
(9) Lancet, Apr. 9, 1910.

and pericardium, less enlargement of the liver and spleen, and very little enlargement or alteration in the appearance of the suprarenal glands.

Adrenalin in Addison's Disease. Sajous[1] analyzes 120 cases of Addison's disease, and says that a number of cases are on record in which, after apparent recovery, the patients died suddenly, soon after ceasing the use of adrenal preparations. It is evident that even the possibility of curing the morbid process in the adrenals does not replace the destroyed adrenal tissue. It is here that grafting would be of curative value, provided only small fragments of adrenal tissue be inserted, and gradually increased in number until the temperature and pulse indicate that compensation for the functionless areas in the adrenals has been effected. The 120 cases analyzed show—and his own experience has demonstrated—that what is generally known as "adrenal extract," but which in reality is desiccated adrenal gland (*glandulæ suprarenales siccæ* of the U. S. P.) is by far the most satisfactory agent to use.

Adrenalin in Tabes. Roehmer[2] has employed adrenalin with good results in 5 cases of tabetic crises. In 3 of these, the crises were of gastric nature, in 1 case, a rectal crisis; and, in the fifth case, a laryngeal crisis with a gastric complication. The dose in the gastric crises consisted of from four to six drops of 1 per cent. adrenalin solution in 20 cc. of water which was administered *per os.* In the rectal crisis, after a previous irrigation of the rectum, from three to five drops, in 20 to 40 cc. of water, were administered *per rectum.* These doses were given three times a day. Under the influence of this medication, Roehmer observed the disappearance of pain, nausea, and vomiting, in 4 of his 5 cases. This action set in after fifteen to thirty minutes, and continued for several hours. After the administration of adrenalin three times a day, the attack ceased entirely.

Adrenalin and Pituitary Extract as Diuretics. Houghton and Merrill[3] have made experiments as to the diuretic action of these drugs. They find that the increased urinary flow in anesthetized animals depends

(1) Month. Cycloped. and Med. Bull., April, 1909.
(2) Sem. Méd., 1909.
(3) Jour. Am. Med. Assoc., Nov. 28, 1908.

chiefly on the increase in blood-pressure produced by the intravenous injection of adrenalin solution or pituitary extract in solution rather than on a specific action on the secreting cells of the kidney. It is possible, however, that a specific action on the kidneys occurs, but if so it is less marked than in the case of the 1 per cent. saline solution. Microscopic observation on the perfused kidney indicated that there was considerable enlargement of the organ while the experiments were being carried out. This would assist in the more rapid secretion of urine especially if accompanied by increased pressure, but, as just stated, there is not the same degree of relaxation or dilatation of the bloodvessels in the kidney as follows the perfusion with the saline itself. This is as we would expect, since experiments on the web of the frog, on the inflamed conjunctiva of the rabbit, and other animals show positively that the pituitary extract does narrow the caliber of the arterioles. If the pituitary extract possesses, as Schaefer believes, a specific secretory effect, it would seem that it should manifest itself by a greatly increased flow of urine when brought in contact with the secretory cells of the kidney. If it does have this specific action it has it to a much less degree than sodium chlorid itself.

ALCOHOL.

Alcohol as a Drug. In the opinion of Osborne[4] the positive value and advantages of the proper use of alcohol as a drug in acute disease when the condition indicates the necessity for physiologic action similar to its activity, cannot be gainsaid. But, he says, alcohol should not be used because a patient is ill or has a fever; though frequently nothing in the drug line, in his opinion, will take the place of alcohol in medicine. He believes that a dose larger than from one to three teaspoonfuls, once in three hours, is probably never indicated, and, if given, should certainly not soon be repeated. As a food, alcohol may save the burning of some tissue during the acute fever when the nutriment is not sufficient or is not metabolized sufficiently, to save fat and muscle. Hence, in fevers it has a distinct food value, but probably no better than that

(4) Yale Med. Jour., January, 1910.

which would be obtained from sugar. In continued cardiac failure or depression, whether in patients suffering from acute or chronic disease, alcohol is contra-indicated, strychnin being generally the best medicinal agent. Consequently strychnin should not be begun early in acute disease, but should be reserved until it is needed, and becomes a life-saver. As a nutriment in chronic diseases alcohol is not economical, and generally is positively disadvantageous to the system.

As a vasodilator in chronic high arterial tension, it should not ordinarily be used. This indication for treatment is present in arteriosclerosis and gout, and is a symptom and sign in late middle life or old age. If arteriosclerosis is present and the patient is well along in life, and has long been accustomed to take alcohol regularly in doses that do not intoxicate, it may be unwise to stop the vasodilating effects of the alcohol until it has been ascertained that some other treatment will be as conducive to well-being. In other words, the physiologic relief from high tension which the patient has been accustomed to acquire by taking alcohol cannot be stopped abruptly without due consideration of the consequences of withdrawing the drug.

Alcohol has been used largely and is ordered frequently, and the laity often resort to it to abort acute colds. Hot baths, combined with hot lemonade or hot tea or other hot non-alcoholic liquids, or a dose or two of a coal-tar sweat-producing drug, or a Dover's powder, and the quickly acting saline cathartics, will accomplish as much in aborting colds as will alcohol, and therefore it is rarely necessary to resort to alcohol in such a condition.

Injections of Alcohol in Neuralgia. Leszynsky[5] reports 15 cases of the alcohol-injection treatment of trifacial neuralgia. This form of treatment, says Leszynsky, when successfully applied, is virtually surgical nerve-resection without the resulting scar. There is no good reason to-day, with the evidence before us, why a patient should be subjected to a cutting operation when the alcohol injection is equally efficacious in the majority of cases, if not indeed more so. Despite the brilliant results from this therapeutic measure, recorded by many competent ob-

(5) Med. Rec., Apr. 30, 1910.

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servers, nerve-resection and intracranial division of the sensory roots, are still recommended and practised under the same conditions as heretofore. Gasserectomy, with its attendant dangers and mortality, has always been considered a *dernier ressort*. Why should it not be considered so to-day? Yet there are surgeons who unhesitatingly operate without a fair trial of the alcohol-injection treatment.

Patrick[6] makes his injections of alcohol in trifacial neuralgia with a straight needle about ten cm. long, one and five-tenths mm. thick, and fitted with a stylet or obturator, the blunt end of which is flush with the needle-point. The sharp point is used to puncture the skin, after which the stylet is pushed home, making a blunt instrument for the remainder of the penetration. The needle is introduced at the lower border of the zygoma, the object being to reach the inferior maxillary division of the nerve at its emergence from the *foramen ovale* (about four cm. deep) and the superior maxillary as it leaves the *foramen rotundum* (about five cm. deep). Deep injections for the supra-orbital branch he has abandoned as being too hazardous. When an injection of this branch is needed, which is not very often, he uses a peripheral injection at the supra-orbital notch. In a few cases he also has used a peripheral injection at the infra-orbital foramen. The solution used is about 85 per cent. alcohol (not absolute) with 4 grains of cocain to the ounce. Of this, about 2 cc. are introduced each time. Morphin and chloroform, formerly used in the solution, he has abandoned. He is positive that when the injection reaches the nerve the pain is stopped at once. The greatest drawback to the method is the uncertainty of reaching the nerve on any given trial. But if the patient is willing to persevere he is practically certain of relief. Of course in many cases one succeeds the first time. The danger of the operation is as nearly *nil* as can well be. Disagreeable complications are exceedingly infrequent. In a few cases injection of the middle branch has caused a small hematoma, which did no harm. In this connection it is worthy of note that in the 75 consecutive cases covered by this report 36 patients were between sixty and seventy years old, 13 between seventy and eighty, and 1 over eighty. The procedure is not excessively pain-

(6) Jour. Am. Med. Assoc., Dec. 11, 1909.

ful, at least patients do not often complain of it. An anesthetic is very rarely necessary. There is no shock. Most of Patrick's injections have been done in the office, and in a few minutes the patients were ready to walk out. There is no reason to believe that these injections effect a radical cure, though occasionally this might be the result. The period of relief to be obtained is hard to estimate. A good injection, as shown by marked analgesia, may be expected to relieve for from one to three years, possibly more. Re-injections after recurrence, and injection in cases in which patients have already undergone peripheral operations, seem to be just as successful as primary injections.

Ostwalt[7] has made about 2,000 injections of cocainized alcohol in neuralgia. All except 8 per cent. of the patients with facial neuralgia were cured. He has treated thus 152 patients with tic douloureux, 20 with facial spasm, and numbers of others with sciatica. He says that with the necessary prudence all accidents may be avoided, and that this treatment gives extremely satisfactory results, and renders the greatest service to the patients.

ALUMINUM SILICATE.

Rosenheim and Ehrmann[8] have investigated the action of aluminum silicate on the gastric secretions and on disease symptoms produced by abnormalities of secretion. They say that in all conditions of stimulated secretion, either hyperacidity or hypersecretion, whether they be primarily of nervous origin or are associated with some organic lesion or injury, aluminum silicate acted as a most favorable drug in reducing the acidity, quieting the pain, and aiding digestion. Especially good results were obtained in very persistent hypersecretion, both of the alimentary and persistent form, with more or less persistent motor insufficiency. Objectively the drug caused an inhibition of the secretion energy, a decrease of the hyperacidity, and a reduction of the flow of gastric juice in the empty stomach. There were also cases in which aluminum silicate caused amelioration of symptoms when other medi-

(7) Bull. de l'Acad. de Méd., Apr. 21, 1908.
(8) Brit. Med. Jour., Jan. 29, 1910.

caments, as the alkalies, had been used over a long period with little or no benefit. On several occasions they observed good results with aluminum silicate in general gastric hyperesthesia depending upon anemia and chlorosis, in persistent paresthesia, in sensory irritability, in cases in which treatment with silver nitrate had been carried out without results.

In ulcers of the stomach, the acid stimulation due to irritation of the peptic glands was influenced favorably. The rapid cures, however, so often seen when ulcers are treated with large doses of bismuth on an empty stomach, could not be obtained to an equal degree by a similar treatment with aluminum silicate. As a rule, aluminum silicate was prescribed in doses of from one-half to one teaspoonful in three ounces of water, three times a day, one-half to one hour before meals. Large doses of the drug were always taken willingly, as it is tasteless and odorless. No undesirable symptoms appeared from its use. This was especially true of the intestines. The authors are not willing to say that the salt has no action on the intestines, as it is perfectly possible that the aluminum chlorid which theoretically is formed, may interfere with the development of the bacterial flora. The authors are now carrying out investigations as to the action of the drug on the intestines.

AMYL NITRITE.

Physiologic Action of Amyl Nitrite. According to C. v. Rzentkowski[1] amyl nitrite in health relaxes the arteries with a very slight reduction of the diastolic blood-pressure. The blood-pressure returns at once to normal on removal of the amyl nitrite, thanks to the elasticity of the arteries. In arteriosclerosis the diastolic blood-pressure drops considerably although the heart-actio may be stronger. On removal of the amyl nitrite conditions return only very slowly to normal, the blood-pressur not returning to its former height until after half an hou The phenomena observed indicate that the highe tension in arteriosclerosis is the consequence of the permanen

(1) Zeitschr. f. klin. Med., B., lxiii, No. 1-2; See also Jour Am. Med. Assoc., June 12, 1909.

organic contraction and immobility of the intestinal arterial system. The true essence, therefore, of arteriosclerosis is the lack of elasticity in the walls of the intestinal arteries. The writer has the patients inhale ten drops of amyl nitrite at once, and has never witnessed any threatening symptoms from it in several hundred experiments on healthy subjects. He has also found it effectual in the treatment of tuberculous hemoptysis.

Amyl Nitrite in the Treatment of Hemoptysis. Squire[2] presents an admirable synopsis of the treatment of pulmonary hemorrhage. If the smallest amount of blood-staining is noticed in the sputum it should be looked on as a danger signal, and the patient should be put to bed at once. Calomel, gr. ij, iij or iv, should be given, depending upon the needs of the patient, followed in the morning by ʒj or more of magnesium sulphate: if necessary, this may be repeated in the day. The patient remains in bed for a couple of days, taking the magnesium sulphate each morning, and if no more staining appears he is allowed to get up, beginning with two or three hours the first day. If the staining continues while the above treatment is given, the amount of milk may be reduced to one pint daily and the patient kept in bed till the sputum is clear for at least three days. Acute hemoptysis is treated by propping up the patient in bed. Amyl nitrite, in doses of 10 to 15 minims, is inhaled. In a slight hemorrhage this is usually sufficient. Smaller amounts than 10 minims do not usually have much effect. In larger hemorrhages, particularly when the nose gets blocked up with blood, it may be necessary to put from 30 to 60 minims on a piece of lint and hold it over the patient's mouth. In some cases, this has been repeated, and the only complaint the patient made was that it produced a feeling of nausea.

Turpentine (m. xxx to lx) may be used as an inhalation when amyl nitrite is not at hand, or spirits of turpentine (m. x to xxx) may be given internally and repeated. Morphin has been given with good results in slight cases: its action is probably due to the relief of anxiety afforded by its sedative effect, with consequent quieter action of the heart. Adrenalin (m. v of a 1 to 1,000 solution) has been injected. It is said to be useful in cavity cases where it is

(2) Clin. Jour., June 16, 1910.

likely that the hemorrhage is due to the erosion of a medium-sized vessel. On the other hand, it is said to be contra-indicated when the hemorrhage is from a ruptured vessel, but is useful in congestive hemorrhage.

It should be a general rule that when the hemorrhage is large and the cavity is known to be present, the patient should be made to lie on the side on which the cavity is located. Subsequent to acute hemorrhage the patient is kept in bed, if possible propped up a little. Purgatives are given, beginning with calomel, (gr. ij to iv), followed by magnesium sulphate, one, two or three times daily; the amount and time must depend on the patient's condition. Milk, one pint, must be given in twenty-four hours, and all other fluid cut off as much as possible, and the patient fed on solids. In some cases calcium lactate, gr. xv, has been given thrice daily for three days and then omitted for three days, and so on; or calcium chlorid (gr. x to xlv) in water or milk, every four or six hours, may be given in a similar manner. Calcium salts increase the coagulability of the blood and thus tend to check hemorrhage. It is not wise to examine the chest too fully nor too frequently during or immediately after an attack of hemoptysis.

ARSENIC.

The Dangers from the Use of Arsenic. Arsenic as a medicament has done more harm than it ever has done good, because the symptoms of its bad action are often hidden and slow in development, and hence have not been noted. The acute signs of overdosage with arsenic, as gastro-intestinal disturbances, epigastric pain, puffing under the eyes, and reddened eyelids, are well understood; but late symptoms of over-use of arsenic such as disturbances of the kidneys, and a breaking-down of the red blood corpuscles (although at first, and in small so-called tonic doses, arsenic will increase the number of red cells) are not noted. The puffing under the eyes in the morning in patients taking arsenic is doubtless due to irritation of the kidneys, and careful examination of the urine in patients taking large doses of arsenic, or in whom small doses have long been repeated, will frequently show albumin, often blood, and possibly severe kidney disturbances. Large doses

of arsenic given hypodermatically for anemia or leukemia cannot only cause the above harm, but may cause multiple neuritis.

The conclusion to be drawn from the above is that arsenic should be given in small doses only, and during its administration the urine should be watched carefully. When it is deemed best to increase the dose gradually to the point of physiologic symptoms, it should be given in solution, and best in the form of *liquor potassii arsenitis*, or Fowler's solution, and the dose should then be increased no faster than one drop a day, not one drop a dose. When a small dose of arsenic is desired for its stimulant and probably tonic action, the trioxid of arsenic may be given in a soluble tablet, or in a pill or capsule, after meals, combined with quinin, iron, or strychnin, any one, or all, if desired. It is a mistake to believe that chorea, chlorosis, or anemia cannot be treated well without arsenic; and if careful, discriminating observations are made, it will be found that arsenic as a tonic may be omitted without any loss in any tonic treatment.

Should Arsenic Be Given in Chorea? Koplik[4] points out that the indiscriminate prescribing of arsenic is even more harmful than the prescribing of quinin in every febrile case. The toxic effects of arsenic on the kidneys have escaped adequate notice. Arsenical neuritis, too, has to be considered. Koplik watches carefully the action of the kidneys in all cases in which arsenic is being used. It was noted that in cases treated with one drop daily of Fowler's solution, and the dose increased one drop a day (not three times daily), until a point had been reached which was called tolerance—namely, until there was slight puffiness of the eyelids—a study of the urine revealed the appearance of albumin before this stage was reached. If the administration was continued, casts, and in some cases blood-cells, would appear. At first, though this seemed exceptional, it was subsequently shown to be the rule.

Another point established, where these results followed on what appeared to be a very moderate administration of arsenic, was the fact that Fowler's solution tends to gather strength. Consequently, in the administration of arsenic, the study of the urine is the most delicate measure of

(4) Med. Rec., Jan. 18, 1908.

warning, the appearance of a trace of albumin indicating the stoppage of the drug, no matter how small the dose, or how excellent the general condition of the patient.

Chorea minor, he asserts, must be recognized as a self-limited disease, and everything avoided that can tend to exacerbate symptoms. Modified rest-cure is advisable in the mildest cases, and it is unwise to give increasing doses of Fowler's solution. A sedative is more to the purpose, sulpho-methyl-methan (trional), five grains three times daily, being recommended. For moderately severe cases, rest in bed without complete isolation is important, and no arsenic should be given if there is cardiac involvement. Sodium salicylate may be useful; but, if badly borne, no drug beyond a sedative should be given, and no digitalis. Strychnin as a bitter tonic has proved useful. Hydrotherapy is of service.

In the severest forms in which speech is lost, the use of arsenic is fraught with danger. The sides of the bed should be padded. In short, Koplik considers the use of arsenic in chorea minor futile and surrounded with danger. Isolation and darkened rooms Koplik disapproves of, as children do better with the agreeable, quiet companionship of others. They need sunlight and air besides.

ASPIRIN.

Acetylsalicylic acid (aspirin) in pneumonia seems to be strongly recommended by the experience of J. L. Andrews.[5] According to his description, the regular effect of the drug is striking. About half an hour after the dose the patients begin to perspire, and continue to do so for about two hours. The drug is given by the author in 10-grain doses four times a day, so that the skin is moist or drenched, as the case may be, most of the time. Co-incident with the sweating, the patient slips off into a quiet sleep, the fever falls, and the pulse improves in quality. The respiration also becomes slower. The patients still continue to have their rise of temperature each day, and there may be a high fever much of the time; but they are always comfortable. The author has not seen any sign of heart depression from the drug; and complications, al-

(5) Am. Med., November, 1909.

though by no means eliminated, are usually mild in form. In fact, he feels, although he does not actually make the claim, that the course of the disease is shortened by the use of the drug.

ATOXYL.

Toxic Effects of Atoxyl. Vassal[6] gives the following as his views as to the action of atoxyl in malaria: Atoxyl alone, in large therapeutic doses, is incapable of stopping or modifying a febrile attack of malaria. It is not a febrifuge, nor is it even moderately antipyretic in its action. Its direct action on the hematozoa of tertian and malignant tertian fever is inappreciable, whether in single large doses or continued small ones. It is powerless against the acute symptoms of malaria. It does not prevent relapses. In short, its specific action is *nil*.

As an adjuvant to quinin, on the contrary, atoxyl shows an unquestionable efficacy. The author cites numerous examples. It rapidly improves the general condition, and restores strength. It is a reconstructant which is superior to the other well-known arsenical compounds. In cachectic enlargement of the spleen, where quinin alone often fails, atoxyl, combined with quinin, proves efficacious. Malarial patients given the mixed treatment tend to increase in weight to a remarkable degree. The red cells undergo no modification, and do not increase in number. The percentage of the different leucocytes remains the same. However, the size of the large mononuclear leucocytes seems to be increased after the employment of atoxyl. He therefore concludes that:—

1. Used alone, atoxyl does not exercise a specific action in malaria.

2. Associated with quinin, it is capable of bringing about a rapid improvement in health, and of hastening convalescence.

3. In cachectic and chronic forms of malaria, quinin with atoxyl appears to be more efficacious than quinin alone.

4. Atoxyl in large doses is sometimes borne with difficulty, and may even give rise to accidents.

(6) Philippine Jour. of Science, February, 1909.

Toxic Effects of Atoxyl. The occurrence of toxic symptoms after the use of atoxyl[7] has been observed and recorded in a considerable number of cases, the most serious being those affecting the eyes, such as retinal hemorrhage, amaurosis, and optic atrophy. Koch observed 22 cases of blindness after its use in the treatment of 1,633 cases of sleeping-sickness. In addition to these ocular effects, various symptoms have frequently been observed, including malaise, attacks of vertigo, insomnia, dryness and irritation in the throat, pains in the limbs, and various paresthesiæ. In some cases slowness of the pulse and even anginal attacks have occurred, while anorexia, vomiting, diarrhea, and jaundice indicate its effects on the digestive system. Albuminuria, nephritis, and painful micturition have also been described, as well as various cutaneous lesions.

These toxic effects are analyzed in a paper by Heinrich Schlecht,[8] of Professor Strümpell's clinic at Breslau, and details are given of a case in which the administration of atoxyl was followed by death. The patient was a butcher, twenty-eight years of age, who developed a chancre in November, 1907. Apart from an attack of enteric fever ten years before, he had always had good health. There was no history of epilepsy or of alcoholism. Ten weeks after the development of his chancre, a maculo-papular rash appeared, with condylomata at the anus. He was then treated by mercurial inunction for three weeks. A little later he was given five grams of potassium iodid daily by the mouth, and received four injections of 0.1 gram of salicylate of mercury subcutaneously. After a further interval of six days, during which the patient felt well, atoxyl was given in four separate doses of 0.6 grams spread over a period of eight days, the total quantity given being therefore 2.4 grams. The day after the last injection, the patient became seriously ill with malaise, anorexia, vomiting, and sudden rise of temperature. Within a few hours, epileptiform attacks supervened, with tonic and clonic spasms and complete loss of consciousness. The pupils were sometimes contracted, sometimes dilated, and insensitive to light. The tendon reflexes, which at first were

(7) Lancet, June 19, 1909.
(8) Muench. med. Wochenschr., May 11, 1910.

abolished, later became exaggerated, and a Babinski reflex was obtained on both sides. A high degree of cyanosis supervened, respiration was sometimes deep, at others rapid and superficial, while during the fits breathing would cease for considerable periods, to be followed by markedly dyspneic respiratory movements. The heart's action became very weak, the pulse rapid and small. The urine contained albumin and casts. Examination of the blood showed a marked leucocytosis and some polycythemia. Death occurred in one of the epileptiform attacks.

At the necropsy, the heart muscle showed degenerative changes, and there was marked edema of the lungs. The liver showed fatty and necrotic areas, and there were signs of marked destruction of red blood-corpuscles both in the liver and spleen. The kidneys were large, soft, flabby, and congested. In the central nervous system, the only changes observed were local proliferations of the neuroglia in the cortex, and recent degenerative changes in the vessels.

Schlecht inveighs strongly against the use of atoxyl for syphilis, blood diseases, and skin lesions, for which ordinary methods of treatment are available. He suggests that there may be in some persons an idiosyncrasy to atoxyl, since atoxic symptoms are on record after comparatively small doses, and he recommends the utmost care in its use. He gives no details of the source of the atoxyl used in the case he records. From the literature it would appear that some samples of atoxyl give rise to toxic symptoms more often than others, and it is possible that an impurity may be the cause of some of the serious effects observed. It is obviously of the utmost importance that the substance should be free from arsenates, and that it should contain its arsenic in the form of arsenite. Schlecht's case is a further indication that atoxyl is a drug which must be used with great discrimination, and that its effects must be watched very carefully.

ATROPIN.

Atropin in Diabetes Mellitus. J. Rudisch[9] sums up the action of atropin in diabetes mellitus under the following heads:

(9) Med. Rec., June 26, 1909.

1. Reduction in the amount of sugar excreted. It was uniformly observed that glycosuria disappeared much more rapidly under this combined form of treatment than with the customary antidiabetic diet alone. It is a common experience, that, while a strict carbohydrate-free diet will usually cause a marked diminution in sugar excretion, traces of sugar will still remain in the urine, or appear from time to time. In these cases, the use of atropin in sufficient dosage has resulted invariably in complete suppression of the glycosuria. Interruption in the administration of the drug without change in diet has been followed in many cases by the re-appearance of sugar in the urine; but this glycosuria can always be made to disappear again promptly by resuming the atropin.

2. Increase in carbohydrate tolerance. The influence of atropin in increasing carbohydrate tolerance is manifested in two ways. The author has frequently noted that an amount of carbohydrate sufficient to cause glycosuria in a patient whose urine has become free from sugar, but who is not taking atropin, will be perfectly well tolerated as soon as atropin is administered. Secondly, after the prolonged administration of atropin tolerance for carbohydrates increases much more rapidly than after a period of antidiabetic diet alone. The appearance of glycosuria in such cases is the signal to resume atropin: and, even without the reduction of carbohydrates, this frequently is sufficient to cause the urine to become sugar-free again.

Rudisch has administered atropin in the form of the methylbromid and the sulphate. The former has the advantage of being much less toxic, but its effects are not so prompt as those of the sulphate. Its cost, moreover, limits its use. As the initial dose of the methylbromid, he has given gr. 2-15 t. i. d. to adults, gradually increasing this gr. 1-15 until gr. 8-15 t. i. d. are being taken. In one case, three grains were given daily over a short period with no other toxic effect than dryness of the throat. The initial dose of atropin sulphate should be gr. 1-150 t. i. d., which dose may gradually be increased to gr. 1-20 t. i. d. Children require a dosage proportionate to their age. The youngest patient, a nine year old boy, received an initial dose of gr. 1-250 of the sulphate three

times a day; and this dose, in the course of several months, was increased gradually to gr. 1-10 *per diem*.

It is noteworthy that these unusually large amounts of atropin are well tolerated, provided the initial dose is small, and the increase gradual. It is not necessary to attain the maximum dose in the majority of cases, however, much smaller amounts often causing the glycosuria to disappear. With the appearance of the first toxic symptom, usually a marked dryness of the throat, the atropin either was stopped entirely, or, more often, the attempt to increase the dosage was abandoned temporarily. It was always possible to resume the drug after a period of rest.

While the tolerance for atropin varies in different individuals, the author has not observed a single case in which a peculiar susceptibility totally precluded the administration of one or the other of the salts previously discussed. In no instance was an atropin "habit" acquired, nor were there any deleterious effects upon the general health observed from its prolonged administration.

Atropin in Bronchial Asthma. P. V. Terray[2] protests against the general neglect of atropin in treatment of bronchial asthma. As the affection is a neurosis atropin is indicated theoretically, and he has witnessed excellent results from it in certain cases although it is by no means a panacea in all cases. In one case he has succeeded not only in arresting the attacks with it, but the patient was improved so that there was no recurrence of the asthma for ten months although the man had been affected with it constantly for twenty years. Atropin can be used advantageously as a substitute for or to alternate with morphin. He describes the cases of 7 patients with severe asthma treated with atropin, the results being quite encouraging. He prescribes atropin in pills containing each 0.0005 gm. (1-120 gr.) at first one a day, then, after two or three days, gradually increasing to a total of from four to six pills a day, and then gradually reducing the dosage to one pill a day. The atropin not only arrests an attack, but it seems to prevent recurrence. He never saw any ill effects from this dosage.

(2) Med. Klin., Jan. 17, 1909.

BISMUTH PASTE.

Ely[3] reports 14 cases of tuberculous sinuses in which the sinuses were injected with paraffin and white wax, or bismuth and petrolatum. He found that the infected sinus from a case of Pott's disease healed up while the bismuth injections were being used. The fact is enough to justify an extended use of the treatment, for heretofore an infected sinus from Pott's disease was considered the patient's death warrant. A rather long sinus in a case of hip-joint disease, with necrosis of the tissues at its mouth, has for months been kept from secondary infection. A case at the elbow with a sequestrum was not benefited at all. This agrees with what Beck has already said. In the presence of visceral involvement, the injections are of little use. The bismuth is of more use in old infected sinuses than in recent ones. In the cases of tuberculosis of the os calcis the injections were not of much value. The one case of his series that was helped by them was not a typical case.

He concludes that the treatment of these patients at the Sea-Breeze Hospital in the past few years has undergone a complete change. Instead of permitting the tuberculous abscesses to rupture and become infected, and then watching the patient fight out the mixed infection as best he can, the physicians at the hospital now attack them, before rupture, with the aspirator, and inject the cavities with iodoform mixtures. If, in spite of all their efforts, the cavities rupture, then they inject them with bismuth paste, and try to prevent secondary infection. In the face of a mixed infection there is still hope for results from bismuth or from the hyperemia treatment of Bier.

BISMUTH SUBNITRATE.

Beck[4] states his conclusions as to toxic effects of bismuth subnitrate as follows:

Bismuth subnitrate administered by stomach, in small doses, is harmless. In the presence of certain bacteria in

(3) Am. Jour. Surg., January, 1910.
(4) N. Y. Med. Jour., Jan. 2, 1909.

the feces of children, bismuth subnitrate will liberate nitrites, which will be absorbed by the intestines, and eliminated by the kidneys; and, if the production is faster than the elimination, methemoglobinemia will result. In large doses by mouth, it is liable to produce an acute nitrite poisoning, characterized by cyanosis, collapse, methemoglobinemia, and may terminate fatally. Rectal injection of small doses of bismuth subnitrate may cause nitrite poisoning much more quickly and severely than when administered by mouth.

Children are more susceptible than adults to nitrite poisoning from the administration of bismuth subnitrate. Persons suffering with intestinal putrefaction are very susceptible to nitrite poisoning when bismuth subnitrate is injected into the bowels.

Bismuth injected into sinuses, and encapsulated, will gradually be absorbed, and may be found in the liver, spleen, muscles, and intestines.

Characteristic symptoms, consisting of black borders of gums, ulcerations of mucous membranes, diarrhea, and desquamative nephritis, may appear several weeks following the injection of the paste.

After the injection of large quantities of the bismuth paste into suppurating sinuses, mild symptoms of nitrite intoxication may appear. Acute nitrite poisoning is to be regarded as a distinctly separate affection from that arising from the more chronic bismuth absorption.

Radiographers should employ some other preparation of bismuth than the subnitrate, and refrain from injections of subnitrate into the bowels, especially if intestinal putrefaction is present.

BROMIDS.

Bromids in the Treatment of Epilepsy. Epilepsy and its treatment is discussed by H. Climenko,[6] his remarks being based upon 48 cases from the clinic of Collins. According to Climenko, the treatment resolves itself into three parts: 1, Removal of cause, or mitigation of its activity; 2, counteracting and overcoming peripheral and chemical irritants; 3, the treatment of the motor cells directly.

(6) Post Graduate, January, 1909.

The plan of treatment is: Thorough examination of the patient is made, including, if possible, an examination of the urine and feces, as a preliminary step in the treatment. All peripheral causes of irritation are removed as far as possible. These may consist of disturbances in the upper respiratory tract, especially frequent attacks of tonsilitis, adenoids, etc.; and although no one claims that the removal of adenoids or tonsils may cure epilepsy, yet there is no doubt that improvement of the bodily condition will be certain to bring about a better state of health for fighting the disease and also do away with the peripheral irritation of these conditions.

No part of the body deserves keener investigation than the ocular system. One of the invariable rules is to submit every patient to a careful refraction and to a test of his ocular muscles, not that epilepsy is reflex from eyestrain, but that epileptics have eye abnormalities that demand correction. Irritation in the auditory canal is especially important. Attention to the sexual organs, especially in children, is of importance, and examination of the urine for signs of intestinal putrefaction and of the feces for worms should never be neglected.

A factor of great importance in the treatment of epilepsy is the diet. All sorts of spices, coffee, tea, and particularly alcoholic beverages, should be strictly prohibited. The diet should consist mainly of substances not likely to produce intestinal putrefaction. A milk-vegetable-egg diet is the ideal diet for an epileptic. All sorts of preserved foods should be avoided, first on account of the toxins they are likely to contain, and secondly, because of the presence of sodium chlorid. Common salt, or table salt, is withdrawn entirely from the diet. Dechlorinization seems greatly to facilitate the working of the bromid, and in some cases helps to reduce the dose of the bromid to six or eight grains per day.

The direct treatment of the motor cells consists in the administration of one or more of the various salts of bromids. Used intelligently, they not only modify and in some instances abort the attacks, but, contrary to the general opinion, they invigorate the patient. In reality, the bromids seem to have a tonic effect on epileptics. No special dose can be indicated. Enough bromids should

be given to produce an effect.

William Lesem[7] believes that the value of bromids in epilepsy has been greatly overrated. The dosage commonly employed is not only excessive, but deleterious when its administration is prolonged. Small doses produce as good results as larger ones. Half of the favorable cases respond to treatment without any bromid being prescribed. When employed without ordering a salt-free diet, the use of the bromids is almost valuless. Any decided amount of sodium chlorid in the blood acts as an irritant upon the cerebrum, and increases the frequency and severity of the attacks. While it is not known why the exclusion of salt from the patient's diet is so beneficial in the treatment of epilepsy, it is known that equally brilliant results are obtained by its prohibition in chorea. Less than 10 per cent. of all cases of epilepsy are curable, and only 50 per cent. of carefully selected cases were benefited by prolonged treatment.

Bromids in the Psychosis of Epilepsy. Siemerling[8] states that certain cases of epileptic psychosis are observed to end in recovery, in the absence of special therapeutic procedures, while the amenability of these conditions to treatment is a subject still open to discussion. There is no doubt, however, but that a favorable effect can be exerted upon the course of the epilepsy and the epileptic psychosis through certain remedies, more particularly prophylactics, for the control of the attacks, by means of abstinence from alcohol, a suitable diet—restriction of meat, in favor of milk, vegetables, and fruit—improvement of the digestion, regulation of the patient's entire mode of life, attention to cardiac or vascular disturbances, and other organic affections. In a number of cases, a threatened attack may be aborted by the administration of large doses of bromids (10 to 14 gm. daily). The bromids are at the same time the sovereign remedy for the epileptic disturbances. It is useful to combine the remedy with the ingestion of large quantities of water.

When bromism or acne makes its appearance, the use of the remedy should be interrupted for some time. In the presence of cardiac disturbances, the simultaneous ad-

(7) Am. Med., April, 1909.
(8) Berlin. klin. Wochenschr., Jan. 4, 1909.

ministration of adonis vernalis, strophanthus, or digitalis, is advisable. No particularly favorable results have been found to attend a salt-free diet. Other procedures entering into consideration for the control of the excited states, besides the customary measures—isolation, baths, packs—consist in sedatives, such as large doses of bromids; amylen hydrate, chloral hydrate, isopral; injections of duboisin-hyoscyamin; and chloral hydrate enemata.

CALCIUM SALTS.

Calcic Salts in Tetany. In studying a case of tetany, Kinnicutt[9] reached the following conclusions:

1. Soluble calcium salts rapidly exert a controlling effect on the tetanic symptoms.
2. This effect is maintained only by their continued use.
3. Large infusions of salt solutions, used alone, exert a comparatively slight effect.
4. Parathyroid preparations (nucleoproteid) given by the mouth exert a slight influence, if any, in controlling the hyperexcitability of the nervous system. The effect of the nucleoproteid given subcutaneously cannot be estimated positively in the present instance, as it was given alone only during a period of twenty-four hours, and when the tetanic symptoms had been controlled practically by the calcium salt. A distinct renewal of the spasm at the end of this interval led to the renewed use of the calcium salt in combination with the parathyroid material. The demonstration of the controlling influence of soluble calcium salts upon the characteristic symptoms of at least one important variety of human spontaneous tetany—the tetany of gastrectasis, with stagnating stomach-contents—suggests a probable similar therapeutic value of these salts in other forms of the disease in human beings.

Calcic Salts in Lymphatic Headache. Luff[1] discusses the type of lymphatic headache which occurs more frequently in women than in men, and which generally manifests itself as a dull, heavy ache in the frontal region or occasionally as a throbbing pain in the frontal and

(9) Am. Jour. Med. Sciences, July, 1909.
(1) Med. Standard, July, 1909.

temporal regions. In a few cases it may occur in any part of the head. Generally it is experienced on waking in the morning, and usually diminishes in intensity or disappears after a few hours. It is most intractable to the ordinary methods of treatment for headache, and may persist for years unless the association of it with a lowered coagulability of the blood is recognized, and suitable treatment for that condition employed. The subjects of this form of headache are usually of the lymphatic type, with a tendency to slight edema of the face, eyelids, hands, and feet. There is generally some anemia and a varying amount of lassitude, both physical and mental.

G. W. Ross was the first to suggest that serious hemorrhage might be the basis of these headaches, and he demonstrated that in 10 cases of lymphatic headache, which were definitely shown to have a lowered coagulability of the blood, the administration of a calcium salt was followed in every case by the exaltation of the coagulability of the blood, and concomitantly with or closely following upon this alteration in the blood the headaches were relieved.

Calcium Acetate.

Risel[2] has examined 22 children with signs of more or less spasmophilia from nutritional disturbances or rachitis. He added to their milk or gruel a 3 or 5 per cent. solution of calcium acetate. The results showed very little influence from the calcium on the tendency to convulsions. The electric excitability of the peripheral nerves was not increased, but rather diminished, as also the spasmophilic tendency.

Calcium Chlorid.

Gewin[3] is of the opinion that calcium chlorid has a certain degree of efficiency in the prevention and mitigation of sea sickness. He also states that every alternate patient in a series of 200 was given calcium chlorid by the mouth when diphtheria antitoxin was injected. The results confirmed the efficacy of calcium chlorid in the prevention of serum sickness, or at least in its attenuation so that the drug is now given as a routine measure in

(2) Archiv. f. Kinderheilk., July 4, 1908.
(3) Muench. med. Wochenschr., Dec. 22, 1909.

every case. The dose was 1 gm. (15 grains) for the larger dose of serum and half this with the small doses.

Calcium Lactate.

Calcic Lactate in Skin Affections. Bettmann[4] has obtained remarkable benefit in a certain proportion of itching skin affections from the internal administration of calcium lactate in a 5 per cent. solution, one or two tablespoonfuls an hour before meals, three times a day, for three or four weeks. His experience with 70 cases showed that the remedy failed to influence the affection in the majority of the cases; but in others the effect was marked, encouraging further trials of this simple medication, which his experience has shown to be harmless. It proved efficient in conditions peculiarly rebellious to other measures, especially in the toxicodermias. In senile pruritus, in particular, the effect was marked.

Calcic Lactate in Hemorrhage. Simpson[6] remarks that clinical experience shows that calcium lactate has a controlling influence in hastening the coagulation of the blood. Its efficacy is more marked in hemophilic patients, where the coagulation is delayed, than in cases of normal coagulation time. Before operation, especially on tonsils and adenoids, careful inquiry should be made relative to any hemophilic heredity or tendency. In suspicious cases, the coagulation period should be determined before operation. It is questionable, if not positively contra-indicated, whether such operations should be undertaken in hemophilic cases, other than under the most extreme urgency. In all cases of operation for the removal of tonsils and adenoids, calcium lactate should be given for a period prior to and after the operation, both for its possible effect in diminishing the immediate hemorrhage, and in preventing secondary surface hemorrhage. Of the calcium salts, the lactate is more positive in its results, is more agreeable to administer, and is less irritating to the stomach.

Calcium Sulphid.

Calcic Sulphid in Purulent Processes. Ussher[8] says

(4) Muench. Med. Wochenschr., June 22, 1909.
(6) Med. Rec., Sept. 25, 1909.
(8) Med. Rec., Sept. 25, 1909.

that calcium sulphid will disinfect and bring about absorption of even large quantities of pus, and will prevent pus formation. For some reason, possibly non-absorption or age of drug, it is not always specific. It appears to be a specific cure and anti-infectant as well as prophylactic in typhus exanthematosus, variously known as famine fever, prison fever, and ship fever: is an efficient prophylactic for scarlet fever; and distinctly modifies scarlet fever and measles. It prevents pustulation, pitting, and secondary fever in smallpox, very decidedly shortens the disease, and appears to lessen if not entirely destroy the contagion, and also to act as an efficient prophylactic in the absence of vaccination. The dose will vary according to the patient, and seems more dependent upon constitution than upon age or body weight. He gives small doses frequently repeated. The physiologic effect of saturation is the odor of sulphuretted hydrogen from the skin and breath, not belched from the stomach.

CANNABIS INDICA.

Cramer[9] reports upon the effect of what he calls *extractum cannabis indicæ butyricum* in the treatment of exophthalmic goiter. He calls attention to the fact that in his experience it is one of the best remedies in this obstinate malady, and points out that before the International Medical Congress of 1890, See recommended this drug in functional disorders of the heart and stomach, such, for example, as cardialgia and pyloric spasm. Cramer states that he has treated 34 cases by this method, and that he would in all cases resort to its internal use before proceeding to more radical measures.

CARBOLIC ACID. SEE PHENOL.

CARBON DIOXID SNOW.

Carbon Dioxid Snow in the Treatment of Nevi, and Skin Affections. Heidingsfeld and Ihle[2] remind us that carbon dioxid snow is specially well adapted for the removal of pigmented and selected types of vascular nevi.

(9) Klin.-Ther. Wochenschr., June 14, 1909.
(2) Lancet-Clinic, Jan. 30, 1909.

It is not particularly efficacious in removing tattoo marks, and possesses a doubtful, and in the experience of the authors, a rather negative value in the successful treatment and permanent cure of lupus erythematosus.

It commends itself for certain forms of senile keratoses and degenerations of the skin. It is still a remedy of too tentative a character to commend itself as the method of choice in epitheliomata, common and venereal warts, lupus vulgaris, leucoplakia, lichen planus, and a host of other cutaneous affections. The authors assert, however, that carbon dioxid snow is an agent that commends itself to every dermatologist as a therapeutic agent of unquestioned merit, worthy of an indispensable place in dermatologic practice.

E. R. Morton[3] has used this remedy in lupus, warts, nevi, and moles. His paper is a summary of his results obtained in the local application of solid carbon dioxid. One case of lupus vulgaris, not a very promising one, did not do well. The patch was near a joint, where it was difficult to maintain firm pressure, and the great amount of movement, incident to the nearness of the joint, was also an unfavorable feature. In a case of lupus erythematosus, results were fairly satisfactory, though no more so than has been found to be the case with other remedies. Of 4 cases of moles, 3 were cured, and 1 improved. This latter mole was in a small boy, but of the size and hairy growth one would expect only on a full-sized man. The hair was removed, but it is too soon to say if the epilation will be permanent. Of 12 cases of warts, 9 were cured, 2 are still under treatment, and 1 disappeared. The crayon is trimmed to a size corresponding to that of the wart, application made with firm pressure until a narrow ring of frozen, healthy tissue is made around the base of the growth by conduction from the centre.

One hundred and five cases of nevi presented 129 lesions for treatment. Of 85 capillary nevi, 74 were cured by one application lasting forty seconds, 6 had two applications, 2 had three, and 2 had four. Of 32 cavernous nevi, 20 were cured by one application, 4 had two, 2 had three. In all cases in which capillary nevi and cavernous nevi were both present, the capillary part was treated by carbonic

(3) Brit. Med. Jour., Jan. 29, 1910.

dioxid snow and the rest by electrolysis. The author has now under treatment some cases of the "port-wine" mark, and he considers the results as promising, though perhaps no better than those from radium. He finds the carbonic dioxid snow applications practically painless, and of only a few seconds' duration. He notes with regard to his "port-wine" cases that the first application seems to have little or no influence in reducing the depth of color even after waiting three weeks. A second application is marked in its effects, and may be sufficient.

J. M. H. Macleod[4] also speaks of the therapeutic value of this remedy in the treatment of vascular naevi, moles, etc. This author secures the snow by means of liquefied gas in a cylinder allowed to play into a baize bag, the inside of which quickly becomes covered. The snow is then scraped off into the mould it is desired to use. Generally the applicators are shaped like an aural speculum, into which a vulcanite plunger is fitted, so that the application may be made with the amount of pressure desired. The variety of lesions treated is about the same as stated in the paper of Morton, except that Macleod has used the remedy for rodent ulcers. He says that it will destroy these, provided they are superficial, and do not involve deep structures. Such treatment, however, does not seem to him to give better results than the actual cautery; and, if the lesion penetrates deeply, it is less efficacious than radium. In regard to nevi and tissues in general, the author says that after the tissue is frozen at the base it thaws in about a minute, and that a few hours afterward an inflammatory reaction sets in. If the lesion treated is larger than the largest applicator, it can be attacked piecemeal; or a piece of thin lead is placed between the lesion and the applicator, as the metal conducts the cold, and by it irregularly shaped lesions can be treated exactly. When the lead is interposed, a longer exposure is necessary than where the applicator is applied directly to the skin. If blisters form, it is wise to use dressings of some mild antiseptic ointment to prevent contamination with pyogenic micro-organisms. As a rule, the pain complained of from the applications of the snow is mild and trivial.

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(4) Brit. Med. Jour., Jan. 29, 1910.

Sauerbruch[5] reports very favorably of the results obtained from the treatment of cutaneous angioma by the direct application of congealed carbon dioxid. The following description is given of the technic of the treatment:

From a cylinder of carbon dioxid such as is used in making frozen microsections, a fairly strong jet of the gas is played upon a piece of cotton-wool. The rapid evaporation of the liquid dioxid causes intense chilling, which condenses a portion of the gas into a snowy powder with a temperature of 70° C. Some of this solidified gas is applied to the surface of the nevus, where it remains from ten to thirty seconds. The intense cold causes extreme contraction of the bloodvessels and anemia of the growth. This is repeated once or twice at the same sitting, the white flakes being applied to different parts of the vascular surface. No dressing is placed over the seat of this operation. The treatment is renewed at intervals of from eight to ten days, until the tumor has disappeared completely. In its cosmetic results, it is stated that this method compares favorably with the methods usually practised, and moreover is free from pain.

Zweig[6] states that the action of solid carbon dioxid in skin diseases is due entirely to the intense cold (—90° C.). The action of the snow can be regulated by the length of time it is kept in contact, and the pressure exerted. The carbonic-acid cylinder is put flat on the floor, and the snow caught by placing a small chamois bag resembling a tobacco pouch over the outlet. The gas is allowed to escape intermittently from three to five seconds at a spurt. The snow so formed is packed into glass tubes ten to fifteen cm. long, and of a diameter dependent upon the size of the lesions to be treated. He reports 25 cases treated by this method with excellent results. The list includes nevus, angioma cavernosum, lupus erythematosus, lupus vulgaris, and epithelioma.

Carbon Dioxid Snow in the Treatment of Lupus Erythematosus. William S. Gottheil,[7] speaking of the treatment of lupus erythematosus by solid carbon dioxid, concludes that this disease, in the vast majority of cases, is an affection that persists and progresses indefinitely. Spontaneous

(5) Zentralbl. f. Chir., Jan 2, 1909.
(6) Muench. med. Wochenschr., Aug. 10, 1909.
(7) N. Y. Med. Jour., July 3, 1909.

cure in his experience is unknown. He can recall but a few cases which have improved under the milder measures that occupy the first place in all treatises on the subject Its tendency is to steady progression in most cases, new areas of skin are slowly but surely invaded, and there is apparently no limit to its extension. Cases are referred to in which the entire skin of the face, neck and ears was transformed into cicatricial tissue with all the resultant deformity. Skin destruction, therefore, being the way of cure, the author considers that the problem before us is to cure with as little scarring as possible, both in extent and depth, provided we do enough to destroy the disease foci.

The infiltration in lupus erythematosus varies in location in different cases, being sometimes deep and sometimes quite superficial. In attempting to anticipate Nature's cure and effect in a few weeks, the changes which take place in years, and thus prevent the spread of the malady, an agent should be employed which is as manageable as possible, beginning with a very superficial cauterization, and proceeding with a deeper one only when we find that the lighter measures are of no avail.

He speaks of the difference of scars. One may be only a thin grayish-white veil of connective tissues, a deformity so slight that a magnifying glass is needed to detect it. Another scar may be a depressed white and extremely disfiguring lesion which may be rigid or become keloid, and cause contractures and other deformities: and, remembering that the great majority of these cases occur in females, the importance of deciding on the method of treatment is evident.

The author mentions mineral acids, caustics, alkalies, and the thermocautery as being undesirable. For years he has used trichloracetic acid with fair success, but found it hard to manage, getting deeper and wider effects than intended. During the last two years he has used the solid carbon dioxid, and has found it so effective, and it has so many advantages, that he advises its universal use. Solid carbon dioxid can be whittled into any desired shape, into a long point as thin as a lead pencil, or arranged to cover a flat area as large as a half-dollar, and moulded to fit the irregularities of the surface to be treated. The

strength and amount of application can be gauge with the utmost nicety by varying the time employed and the pressure used. Light pressure, say for twenty seconds, will give a moderate reaction with the ultimate formation of scar tissue, or with an amount of it so superficial as to be practically negligible. Harder pressure for sixty seconds or so will occasion marked reaction and destruction of the skin. Between these two extremes any desired amount of tissue destruction and scar formation can be secured.

The author claims further advantages for solid carbon dioxid. It being a cold cautery, and therefore an anesthetic cautery, is a most important point. While other efficient cauterizing agents, almost without exception, are so painful that most patients require a local anesthetic at least, the application of solid carbon dioxid which is intensely cold causes only trivial pain at the time. A few minutes later there is a moderate amount of burning similar to that after a frost-bite. This wears off entirely in an hour or two. Infants cry while an application is being made, but women bear it perfectly. The author has tried it on assistants and other medical men for removal of moles, birth-marks, and so forth; and they all agreed that the pain was trivial.

The fact that the solid carbon dioxid can be obtained anywhere, that it can be kept for hours and carried about, that it costs very little, and that it is within the reach of all practitioners, and is safe if properly applied, are additional advantages.

CERIUM OXALATE.

G. Baehr and H. Wessler[8] of New York discuss and give in detail the real worth and use of cerium oxalate. They obtained the therapeutic value by carrying out experiments on animals:—

1, To determine the toxicity of cerium oxalate and the oxalates of lanthanum, neodymium, praseodymium, and thorium;

2, to determine the effect of commercial cerium oxalate on vomiting induced with apomorphin hydrochlorid and ipecac;

(8) Archiv. Int. Med., January, 1909.

3, to determine the effects of ceruim nitrate on vomiting induced with apomorphin hydrochlorid; and

4, to determine the general effects of cerium nitrate on the body, and also the paths of excretion of cerium from the organism.

They arrived at the following conclusions:

1. Commercial cerium oxalate is non-toxic.

2. Cerium oxalate has no inhibitory effect whatever on vomiting of central origin.

3. Cerium oxalate may inhibit vomiting due to local irritation of the gastric mucosa, but only when given in large doses for some time, so as to coat the stomach wall fairly generally.

4. Cerium oxalate is not absorbed from the gastro-intestinal tract.

These four propositions show the close analogy between cerium oxalate and bismuth subnitrate. Both are not absorbed by the gastro-intestinal tract. Cerium oxalate has been used, in great part, for the reflex vomiting of early pregnancy. At the present time it is being used by some for relieving the irritability of the stomach in alcoholic gastritis, and by others for allaying the gastric disturbances which occasionally manifest themselves in the course of infectious diseases. It is also of value in gastric ulcer, in which the vomiting is due to local irritation of the mucous membrane. Cerium oxalate accomplishes its purpose by mechanically coating the wall of the stomach. It ought to be administered in doses comparable to those in which bismuth subnitrate is given.

CHLORAL.

The action desired and expected from chloral is to produce sleep and to quiet excitability and irritability of the nervous system.

Chloral hydrate is more or less irritant to the skin and mucous membranes, depending on its concentration. If it is diluted or in syrupy solutions, which it forms when rubbed up with camphor in equal parts, while the first sensation may be that of burning, especially when the skin is irritable, the secondary action is a sedative, the peripheral nerves being slightly dulled, and the part becomes mildly

anesthetized. Chloral solutions or chloral combinations are therefore sometimes used locally with good effect when there is burning or itching of different parts of the body, such as in pruritis ani or pruritus vulvæ. The same burning action occurs when it is applied to mucous membranes, and is followed by a dulling of sensation. If the solution is too concentrated it may cause ulceration; therefore chloral should never be administered in powder or capsule, but should always be given in solution, well diluted. Its primary systematic action is as a sedative to the brain and spinal cord. It seems to act specifically as a sedative to the brain cells and produces normal sleep. Whether this sleep occurs by actually stupefying the brain cells or by diminishing the circulation in the brain has not been determined. It is the nearest to a perfect hypnotic that we have, and may be used whenever a soporific drug is needed, provided there is no serious cardiac or circulatory debility. After an ordinary sized dose the patient awakens in normal condition, and without depression, unless the hypnotic has been frequently repeated. Larger doses will quiet the delirium of meningitis and will stop cerebral and spinal convulsions. When the convulsions are due to spinal poison, as strychnin, or tetanus or hydrophobia, the dose of chloral must be very much larger, almost poisonous. Consequently, when such an action of chloral is desired, it should be given conjointly with large doses of bromid, and if the convulsions are frequent and severe, chloroform must be resorted to rather than the administration of dangerous doses of chloral.

Chloral is a circulatory sedative, causing some vasodilatation, slowing, and in larger doses weakening the heart. In diseased conditions of the heart it has been thought to have hastened death by causing cardiac failure. Except in small doses, it should not be given when the pulse tension is low and the heart action very weak. However, its quieting effect on the circulation and its causing, perhaps, much needed sleep has done a great deal more good than it has ever done harm. Small doses, as 0.20 gram (3 grains) three times a day, have been given to reduce high tension in arteriosclerosis. It will sometimes do this effectually in this small dose, but perhaps generally the nitrites or iodids are better.

It circulates in the blood as chloral, and is excreted largely by the kidneys, ordinarily without causing irritation. It acts rapidly as a hypnotic, and should cause sleep in less than an hour. In concentrated solutions or when it finds the stomach in such a condition that it may be rapidly absorbed, or in poisonous dose ("knock-out drops"), it can produce sleep very rapidly. In view of the fact that a few individuals show a peculiar idiosyncrasy for chloral—delirium, etc.—it is advisable to be cautious in giving it to a patient for the first time.

The symptoms of its profound action are more or less profound stupor, dilated pupils, cold, clammy perspiration, weak heart action, feeble pulse, and gradually failing respiration. The *treatment* of chloral poisoning or poisoning by "knock-out drops" is to wash out the stomach with warm water or to remove its contents by emetics. The body temperature should be kept up with dry heat applications, and strychnin should be given hypodermatically. If a full dose of strychnin, as 1/20 of a grain, does not improve the circulation, atropin in a dose of 1/100 of a grain should be given hypodermatically. If the circulation still fails, resort should be had to intramuscular injections of a saturated solution of camphor in olive oil, 1 c.c. (15 minims), which may be repeated every fifteen minutes for several times, if needed; or an adrenalin or suprarenalin solution (1 to 1,000) may be given once, in a dose of 1 c.c. (15 minims). If the respiration fails, artificial respiration should be resorted to. If at any time after the administration of a therapeutic dose of chloral cardiac depression occurs, strychnin and digitalis should be given.

Chloral is a very disagreeable drug to take. It can not be given hypodermatically on account of the size of the dose and the irritation that it causes. It is rarely advisable to give it by rectum unless convulsions prevent its administration by the mouth. It has a nauseating, acrid, burning taste which is not readily disguised. It should always be given well diluted.

Chloralum hydratum, U. S. P., occurs in crystals which are very soluble in water and alcohol. It is incompatible with alkalies. The ordinary dose is 1 gram (15 grains), and when given by rectum, 1.50 grams (22½ grains.)

As above stated, it is almost impossible to disguise the

taste of chloral, but it is perhaps best administered in sour solutions, or it may be ordered in plain water and given in fresh lemonade.

℞

	gm. or c.c		
Chlorali hydrati	10	or	ʒiij
Aquæ	50		fʒij

M. et Sig.: A teaspoonful in half a glass of fresh lemonade, or in carbonated water, one-half hour before bed time.

Or:

℞

	gm. or c.c		
Chlorali hydrati	10		ʒiij
Syrupi acidi citrici	25	or	
Aquæ ad	50		āā. fʒi

M. et Sig.: A teaspoonful, in plenty of water, at bedtime.

Or:

℞

	gm. or c.c		
Chlorali hydrati	15		ʒivss
Syrupi aurantii	50	or	
Aquæ ad	100		āā. fʒiss

M. et Sig.: A teaspoonful, with plenty of water, as directed.

Chloral is often combined with one or more bromids. Generally, however, it is best to have these nerve sedatives in separate solution so that one may be increased or diminished without variation in the dose of the other, if it is so desired. For instance, in delirium tremens, it may be best to continue the bromid and to stop the chloral, or to increase the amount of bromid without increasing the amount of chloral. However, if it is desired to combine them they may be given as follows:

℞

	gm. or c.c		
Chlorali hydrati	5		ʒiss
Potassii bromidi	10	or	ʒiii
Syrupi acidi citrici	50		
Aquæ ad	100		āā. fʒii

M. et Sig.: Two teaspoonfuls, in water, and repeated in two hours if deemed advisable.

Shoemaker suggests the following combination:

℞

	gm. or c.c		
Chlorali hydrati	10		ʒiii
Potassii bromidi	15	or	ʒivss
Syrupi lactucarii	50		
Syrupi aurantii ad	100		āā. fʒii

M. et Sig.: Two teaspoonfuls in plenty of water, at bedtime.

The National Formulary recognizes *Chlorali et potassii bromidi composita.* Four c.c. (1 fluid dram) of this preparation contain 0.80 grams (12 grains) each of chloral and potassium bromid, and 0.008 gram ($\frac{1}{8}$ grain) each of extract of cannabis indica and hyoscyamus. The dose is a teaspoonful.

When there is pain chloral may be combined with morphin to produce sleep, as:

℞

	gm. or c. c.		
Morphinæ sulphatis		.08	gr. iss
Chlorali hydrati	5	or	ʒiss
Glycerini	10		fl ʒiii
Aquæ	ad 50		ad fl ʒii

M. et Sig.: A teaspoonful, in water, as directed.

The National Formulary also recognizes *Chloral camphoratum,* a combination of equal parts of chloral and camphor, which, as above stated, when rubbed together make a liquid. This preparation is for external use as a sedative for painful nerves and for itching when there is not much irritation of the skin.

Cocain may be added to this combination, as:

℞

	gm. or c.c		
Cocainæ hydrochloridi		60	gr. x
Camphoræ	15	or	
Chlorali hydrati	15		āā, ʒss

M. et. Sig.: Use externally as directed.

The combination of chloral and camphor may also be used on flea and mosquito bites.

Chloral hydrate applications are sometimes used in urticaria, as:

℞

	gm. or c.c		
Chlorali hydrati	5		
Acidi borici	5	or	āā, ʒiss
Aquæ camphoræ	200		fl ʒviiss

M. et. Sig.: Use externally.

Chloral hydrate may be incorporated into an ointment and may be thus used locally in neuralgias and myalgias, as:

℞

	gm. or c.c		
Chlorali hydrati	5		
Camphoræ	5	or	āā, ʒiss
Petrolati albi	25		ʒi

M. et Sig.: Use externally.

If chloral is added to a stimulating liniment it will increase its counter-irritant action, as:

℞

	gm. or c.c		
Chlorali hydrati	5	or	ʒiss
Linimenti chloroformi	100		fl ʒiv

M. et Sig.: Use externally.

CHLORALAMID.

Chloralformamidum (U. S. P.) occurs as crystals which are a compound of chloral and formamid. It is soluble in

water in 5 per cent. solution, and is very soluble in alcohol and glycerin. The dose is 1 gram (15 grains).

Chloralamid may be epigrammatically described as acting "just like chloral, only less so." This means that it is less soluble, less irritant, less rapidly absorbed, less powerful as a hypnotic, has less nerve sedative action on the brain and spinal cord, and is less of a circulatory depressant.

On account of its being less irritating in the stomach than chloral it may be administered in capsule, as:

℞

	gm.		
Chloralformamidi	10	or	ʒiiss

Fac capsulas siccas 20.
Sig.: Two capsules, with a glass of water, two hours before bedtime.

Chloralamid is better, however, administered in solution, as:

℞

	gm. or c.c		
Chloralformamidi	10		ʒiii
Glycerini	25	or	fʒi
Spiritus frumenti .....ad	100	ad	fʒiv

M. et Sig.: Two teaspoonfuls, in a half glass of water, hour before bedtime.

CHLOROFORM.

Chloroform as an Anesthetic in Tuberculosis. J. Walsh[9] objects to the use of ether in tuberculous cases, especially active tuberculosis of the lungs. During the past six years, he never has allowed his patients thus affected to be operated on under ether if he could possibly prevent it, and he never has seen any bad results that could possibly be attributed to chloroform in these cases. During the same period, he has seen a number of patients manifesting active tuberculosis of the lungs, which activity appeared from the history to be due either to the operation or to the ether. He reports several cases in which chloroform not only did no harm, but seems rather to have had a beneficial effect, and one of nitrous-oxide-gas anesthesia which had a similar outcome. Two cases of damaging after-results from ether anesthesia also are reported. While a mere statement of the cases makes it appear that chloroform might even be somewhat curative, as asserted by Holmes and Woodcock of London, he is not ready to advocate it as such. He

(9) Jour. Am. Med. Assoc., Aug. 28, 1909.

does, however, believe that in case of necessary operation with anesthesia in all cases of tuberculosis of the lungs, or where it may be suspected to exist, chloroform, and not ether, should be the anesthetic.

Chloroform in the Treatment of Pulmonary Hemorrhage. J. B. Fish[1], after referring to a previous paper[2] on the successful use of chloroform in pulmonary hemorrhage, says that he has continued his experiments and now practices this treatment alone in such cases. The effect of chloroform on the circulation is chiefly to decompress the vasomotor system, causing an extraordinary fall of blood-pressure. Complete vascular relaxation follows, and the patient, so to speak, is bled into his own vessels. There is also some cardiac enfeeblement and dilatation, which also contribute to lowering the blood-pressure. Chloroform has also a depressant effect on the respiration, and, as it produces coagulation of the blood *in vitro,* it is possible that some direct contact with the bleeding point by the vapor may also have some effect.

He describes his mode of administration of from 2 to 4 c.c. of chloroform on an ordinary inhaler or wad of cotton held near the nostrils of the patient. The hemorrhage will cease within 5 to 10 minutes, and during the following 24 to 48 hours, the patient will be bringing up blood-clots. The inhalation of from 15 to 20 drops every hour is continued for a few days; and ammonium chlorid, with small doses of codein, is given internally every 4 hours to expel the retained secretions and to prevent excessive coughing. It is a good plan, he says, also to give a teaspoonful of magnesium sulphate to keep the bowels free. In the limited number of cases in which he has used this treatment the results have been all that could be desired, and he recommends it to a further trial by others.

CHLORETONE.

Chloretone in Tetanus. Hutchings[3] states that he has become convinced, as the result of experiments, that chloretone is the best substance that thus far has been employed for controlling the muscular manifestations of

(1) Jour. Am. Med. Assoc., June 12, 1909.
(2) Jour. Am. Med. Assoc., Mar. 13, 1909.
(3) Ann. of Surg., July, 1909.

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tetanus. He has treated 6 cases, with 5 recoveries. Of these 1 was mild, 1 moderate, and 1 fulminating. It is to be noted that in the first case the patient was suffering from a crushed phalanx, and exhibited an incubation period of six days. This patient was given fifteen hundred units of antitetanic serum every twenty-four hours, with large doses of morphin, chloral, and bromids. He steadily became worse for four days, when clonic convulsions were frequent and severe, and opisthotonos was well marked, though the teeth could be separated slightly, and the patient could swallow. The administration of thirty grains of chloretone, dissolved in half a glass of whisky, was followed in a few minutes by natural sleep, with natural relaxation. During this period, the jaws could be opened to their fullest extent. This quiet sleep of five hours' duration was followed by a moderate return of convulsive symptoms, for which twenty grains of chloretone and whisky were given. Following this, there was a period of rest and quiet for twelve hours, during which the patient could readily swallow and take nourishment freely. Thereafter the convalescence seemed perfectly smooth for some days, when the patient was seized with a severe, shocking pain in the belly, attended with rapid pulse and high temperature, with a fatal result in a few hours. Autopsy showed a perforation of the colon. All the symptoms indicated a complete recovery from his tetanus.

The second patient exhibited a period of incubation of six days, the infection having been acquired during the progress of an abortion. Two days later clonic convulsions came on, which increased in severity. The patient was anesthetized, her uterus curetted, and thirty grains of chloretone, dissolved in whisky, were given. It was regurgitated almost immediately. Two thousand units of antitetanic serum were also given intravenously. On recovering from the anesthetic, she was unable to swallow, and all previous symptoms returned. Thirty grains of chloretone, dissolved in hot olive oil, were given *per rectum*, and retained. An hour later, the patient was sleeping quietly, with relaxed muscles, and the mouth could be opened to its fullest extent. On awakening from this sleep, there was some return of rigidity; but the jaws could be opened, and nourishment could be taken readily. The chloretone

was repeated, and in thirty minutes she was sleeping quietly, completely relaxed. Thereafter recovery was uninterrupted, the chloretone being repeatedly given. Each day three thousand units of antitetanic serum were given subcutaneously.

The third case, a mild one, exhibited an incubation period of ten days, the wound of infection having been inflicted by a blank cartridge. The yielding to treatment was prompt and complete.

In the fourth case the incubation period was uncertain, there having been some plastic work done for the original injury. The chloretone treatment seemed to be entirely efficacious.

The fifth case was a mild one following extraperitoneal shortening of the round ligament. The incubation period was twelve days, and the treatment was efficacious.

The sixth case, an alcoholic suffering from compound fracture of the right arm at the elbow, exhibited an incubation period of four days. As is usual in such cases, the symptoms were extremely pronounced. Seventy-five grains of chloretone in two ounces of hot olive oil, were given by rectum. This dose was followed by quiet sleep and relaxed muscles. Cultures from the wound were positive for tetanus. On awakening, there were occasional slight tonic contractions, and fifty grains of chloretone to the ounce of olive oil were given *per rectum*. This was followed by a period of quiet until severe clonic convulsions ensued, when the chloretone was expelled. On account of the frequency and severity of the convulsions, the patient was anesthetized, and fifty grains of chloretone in one ounce of whisky were given per stomach tube. The effect was almost immediate, the patient went quietly to sleep, with relaxed muscles. A few hours later, the pulse became rapid and weak, and the patient died.

COLLARGOL.

Th. Mironescu[4] made a comparative test of treatment with collargol enemata and with cold baths in typhoid fever. The severity of the cases in which callargol was resorted to was evidenced by the temperature as well as

(4) Berlin. klin. Wochenschr., Jan. 4, 1909.

the grave appearance of the patients. None the less all 17 collargol cases recovered, while there were 4 deaths in the 17 others. The marked difference in the course of the disease was also strikingly evident. The collargol enemata always had a favorable effect on temperature and on the general condition. The duration of the disease was shortened, and complications were prevented. In the cases not treated with collargol, the fever lasted ten to fifteen days longer. Intestinal hemorrhage never occurred in the collargol cases, while this complication was seen in one-third of the others. This fact was proved by examining the feces by Weber's method.

While typhoid fever is initiated by a leucopenia, collargol increased the leucocyte number to normal. Thus in one case, with a leucocyte count of four thousand, the number rose to seven thousand in twenty-four hours after the first collargol enema. The leucocytosis is not without influence on the follicular intestinal ulcers, and this explains the non-occurrence of intestinal hemorrhage.

The rectal method enables the administration of very large doses of collargol. The patient gets daily one or two enemata of seventy-five grains of collargol in three ounces and a half of water, preceded by a cleansing irrigation. When the enemata were not retained, ten to twelve minims of tincture of opium were added to them; or, if necessary, fifteen-grain capsules of collargol (eight to ten a day) were used *per os*; but this is not so effective. The non-toxicity of collargol was shown by the fact that some of the patients took *per rectum* a hundred and fifty grains daily, for ten to twelve days, without the least untoward symptom.

CONDURANGO.

According to recent researches, condurango is regarded as second only to absinth as a stomachic. The active principle of the bark appears to have a similar constitution to cinnamic acid. It has been known popularly from 1871 as a cure for cancer; but this reputation has not been justified in practice. To what active constituent it owes any therapeutic value it may possess has not yet been determined definitely.

Curiously enough, Böhm[5] found that a plant indigenous in the Transvaal, called kawar, also used as a cure for cancer, bore a striking resemblance to condurango in its characteristics, and he suggested that there might be some value in both condurango and kawar of which physicians had not yet learned to make use.

Condurango occurs in quilled or curved pieces having a grayish-brown corky covering. It is variously known as the bark of *Marsdenia Condurango* and *Gonolobus Condurango,* of the family of *Asclepiadaceæ.* Condurango is prescribed in powder form combined with cascara sagrada and flowers of sulphur as a laxative in the following formula:

℞.

Pulverized condurango bark.....gr. ii ¼.
Pulverized cascara sagrada.....gr. ivss.
Sublimed sulphur .....gr. vi ¾.
Mix and divide into three powders.
Sig.: One powder at night.

Condurango has been prescribed in carcinoma of the stomach, combined with benzonaphthol in equal proportions, four grains of each being given four times a d in one cachet.

COPPER SUBACETATE.

Treatment of Pulmonary Tuberculosis. Billard[6] noticed improvement in the condition of two consumptives after they obtained work in a factory producing copper subacetate. They were employed in packing the verdigris, and soon began to improve and had no further hemorrhages from the lungs, while they regained appetite and weight. The verdigris dust is thick in some of the rooms, but none of the employes seem to notice it, and no coughing is heard in the factory. These and other facts observed led Billard to attribute healing-power to the verdigris dust inhaled and he decided to use it in treatment. He has been treating 30 patients systematically in this way since last August, and with encouraging results. He orders the patient to buy two pounds of pulverized copper subacetate, as chemically pure as possible. It is poured into a basin and some is taken up on a card and poured back into the

(5) Muench. med. Wochenschr., Aug. 25, 1908.
(6) Presse Méd., Apr. 7, 1909.

basin from a height; this process is repeated again and again and the dust is inhaled as it rises. The verdigris ceases to give off dust in about two weeks, and it is ground over again. Half an hour morning and evening is the general rule for this treatment. In every case in which the patients followed it the cough and expectoration subsided or ceased, and the patients gained in weight and strength, while the stethoscope showed a regression of the lesions. The only exceptions to this were the acute cases with fever; these patients did not seem to be benefited by the treatment.

CREOSOTE.

Creosote in Pulmonary Tuberculosis. Beverly Robinson[7] states that beechwood creosote, internally and by inhalation, is invaluable in pulmonary tuberculosis. Internally the best formula is: Beechwood creosote (Merck's), six drops; glycerin, one ounce; rye whisky, two ounces; dose, one dessertspoonful every two, three, or four hours, best diluted with a little water.

The best formula for inhalation is: Equal parts of beechwood creosote (Merck's), alcohol, and spirit of chloroform. Use ten drops on the sponge of a perforated zinc inhaler. Repeat a few drops, as required. The inhaler should be used frequently, at first for a few moments each time; later, after a week or more, it may be used half an hour or an hour at a time. Finally, it may be used almost continuously during the day, and frequently all night, without interfering with sleep. Occasionally it is necessary to lessen the proportion of creosote, in the inhaling formula at least, for a while, and until the patient is accustomed to the use of the inhaler. Creosote should always be given in solution. The author states that patients following out his plan will be relieved of their unpleasant symptoms. It will help cure a large number of patients, and will hurt none. It is the best adjunct to fresh air, sunlight, good food, and rest.

Creosote in Infantile Diarrhea. Liachenko[8] believes in view of the bacterial origin of infantile diarrhea, that the rational treatment for these conditions lies in the use

(7) Am. Jour. Clin. Med., July, 1909.
(8) Semaine Méd., No. 4, 1909.

of antiseptics. Of these, he prefers creosote, which is both an antifermentative and an antiseptic. He regards this remedy as indicated in all forms of acute gastro-enteritis, and a specific in cholera infantum. In the last-mentioned condition, Liachenko has been able to save the lives of a number of children by the timely use of creosote. In subacute cases of gastro-enteritis, and even in chronic cases, especially in those accompanied by fetid diarrhea, creosote also gives good results, although in the subacute and chronic type, creosote is indicated merely as a preparatory treatment. It should be given in such cases for two or three days for the purpose of securing a radical disinfection of the digestive tract, after which it should be changed for the usual drugs indicated in these conditions.

Creosote is contra-indicated, however, in acute follicular enteritis, and especially in dysentery, in which it may aggravate the condition by irritating the digestive tract. Nor is creosote to be used in subacute or chronic colitis, in which it not only does not act favorably, but also produces symptoms of irritation.

The author gives creosote preferably in solution, in doses of 0.05 gram (one minim) per day for an infant of one year, and proportionately smaller doses for younger infants. This daily dose is given in eight parts, a teaspoonful every two hours. Usually another mixture is also given, containing 0.5 gram (eight drops) of dilute hydrochloric acid in 125 grams (four ounces) of vehicle, which is to be taken, also, a teaspoonful every two hours, alternating with the creosote mixture.

DIGESTIVE FERMENTS.

Stockton[9] remarks that the question of the administration of digestive ferments in medicine is complicated, and is rendered the more uncertain by lack of precise knowledge as to what becomes of them in the digestive canal. In our present state of knowledge, or rather lack of knowledge, it behooves us to be modest in claiming either good effects or no effects from the administration of these ferments. There can be no question but that a large number of preparations which have been placed on the market are

(9) Jour. Am. Med. Assoc., Nov. 20, 1909.

practically inert. Many combinations that are widely advertised, and presumably largely prescribed, are self-destructive, provided they are made as represented. That is to say, the various elixirs, and so forth, said to contain pepsin, pancreatin, hydrochloric acid, lactic acid, vegetable diastase, and so forth, are not only unphysiologic in theory, but have been shown to be practically worthless so far as digestive activity is concerned.

DIGITALIS.

Therapeutic Action of Digitalis. H. C. Wood, Jr.,[1] of Philadelphia, commenting on the drugs of the digitalis group, and in speaking of digitalis, said that its effect in slowing the pulse he believed to be a much more important factor in its beneficial influence than was generally supposed. In cases of chronic heart disease, when it was essential to make the burden thrown upon the feeble organ as light as possible, the slowing of the pulse was highly important, and here the inhibitory stimulation of digitalis was of the greatest service. The influence of digitalis was exerted especially on the left ventricle. This fact became of importance in certain cases of mitral regurgitation where the ventricular muscle had undergone a larger degree of hypertrophy than the auricle.

The vasoconstricting action of digitalis had frequently been regarded as harmful and consequently to be avoided or combated; he believed this had, at times, led practitioners to adopt irrational or even injurious measures. While it is true that it requires more force to drive the blood through narrow arteries than it does through dilated ones, it is equally true that in many cases the vascular contraction is a conservative effort on the part of nature to maintain the circulatory equilibrium. He did not mean to take the ground that the vascular effect is never detrimental. When as a result of either degenerative changes in the muscle or of an extreme degree of dilatation, the muscular tissue of the ventricle is too scanty properly to respond to the tonic influence of digitalis, it could scarcely be doubted that the increased resistance to the flow of blood might work great damage. He believed, however, that these

(1) Ninth Annual Meeting, The American Therapeutic Society.

cases are much less frequent than is generally supposed.

Clinicians should not be too hasty in their efforts to dilate the vessels, and especially since almost the only agents we possess for this purpose, the nitrites, are substances which increase the rate of the pulse and must tend therefore to counteract the beneficial influence of digitalis in slowing the heart. The only reason that more harm is not accomplished by the use of nitroglycerin in heart disease is because the long intervals between the doses of this evanescently acting drug, as it is habitually administered, preclude the possibility of its having a serious influence upon the circulation. Squill and apocynum, on account of their irritant action upon the gastro-intestinal tract and the kidneys, are of practical utility in selected cases only.

While there is a widespread belief that strophanthus differs essentially from digitalis in that it exercises little or no influence upon the bloodvessels, there appears to be no convincing evidence of the truth of this. On the contrary, it has been clearly demonstrated by Gottlieb and others that the vasoconstricting action of this drug is a very marked one, and that even if this influence is less powerful than that of digitalis, the difference is very slight. It is, however, well established that strophanthus is less likely to give rise to cumulative toxic symptoms than digitalis. Adonidin is a remedy of promise, but although it has been before the profession for nearly thirty years, it still remains in the stage of promise only, since our knowledge of its effects is as yet far from satisfactory. In cases of chronic heart weakness, where merely the cardiac action of this group is desired, digitalis still maintains its supreme position. In conclusion, he spoke briefly of the digitalis glucosides, and expressed the opinion that none of these at all adequately represent the therapeutic virtues of the drug itself.

Effect of Digitalis Upon Cardiac Rhythm. Of the various cardiac irregularities produced experimentally by digitalis, the earliest to appear in most instances is an occasional omission of ventricular contractions, owing to an interruption of the stimulus between the auricles and ventricles. Somewhat later, or even immediately after this, the heart may assume a most peculiar rhythm in which the

auricles and ventricles are beating quite independently of each other. This irregularity differs from the ordinary rhythm of complete heart-block in that the ventricular rate is not slow, but approaches and usually exceeds the auricular rate; so that, for example, one may count sixteen ventricular to fifteen auricular contractions. This rhythm is common in carefully graded digitalis poisoning in dogs, but this form of irregularity has never been described in man.

Hewlett and Barringer[2] report such a case. The heart was distinctly enlarged. There was a soft systolic murmur at the apex transmitted to the axilla and back. The second pulmonic sound was accentuated. The pulse was weak, of small volume, and occasionally irregular. The man had slight but continuous fever, and showed a mild anemia. Blood cultures were negative. The venous tracings taken one day before the patient died were remarkable in that they showed a regularly recurring cycle of changes. Each cycle required about seven seconds for its completion, and included about fourteen ventricular contractions. At certain portions of the cycle, a single, sharp, positive wave occurred in the jugular pulse just after the onset of ventricular systole. Midway between these groups of sharp waves, each ventricular systole was represented on the venous pulse by two waves of almost equal height connected by a more or less distinct plateau. The authors regard it as evident from the duration of these cycles (seven seconds) that they were independent of the respiration, for the respiratory rate was constantly about thirty a minute.

On inquiry, it was found that the patient had been taking drugs of the digitalis series in considerable quantities over a long period of time. During all this time his heart-failure was gradually becoming worse. Although the daily amount of digitalis and its allies did not seem excessive, nevertheless, in view of the fact that the type of arrhythmia corresponded to that seen in experimental digitalis poisoning, it seems probable to the authors that the irregularity was due to a cumulative action of the drug. If this be true, it illustrates how difficult it may be to ascertain when enough digitalis has been given, for at no time was marked slowing of the pulse perceived. This peculiar irregularity

(2) Archiv. Int. Med., February, 1910.

is believed by them to be due to the action of the digitalis in increasing the spontaneous ventricular rate.

Digitalis in Pneumonia. T. F. Reilly[3] reports 150 cases of pneumonia. Of these 126 were of the lobar variety; there were 24 cases of bronchopneumonia; the ages varied from two weeks to eighty years. The fatal cases occurred at the following ages: In lobar pneumonia, at 48, at 60, at 72 and 80; in bronchopneumonia 3 cases at 3 years of age, 1 with asthma, and 1 with measles, and 1 case (tuberculous) at 75. There were 4 deaths in each series, a mortality rate of 3.17 per cent. for the lobar variety and 16.6 per cent. for bronchopneumonia, a general mortality of 5.53 per cent.

The treatment consisted (a) of the uniform administration of quite large doses of some reliable preparation of digitalis, usually the fluid extract, as soon as the diagnosis was made; (b) elimination of the toxins by means of simple diuretics and diaphoretics, the vegetable potash salts, and spiritus etheris nitrosi; and (c) the use of strychnin, caffein, etc., as stimulation was required. The dosage varied with the individual case. A very young adult generally received three minims of the fluid extract every three hours steadily for days, increasing if the pulse increased markedly; a child of 1 year received from two to four minims of the tincture, or one-half drop of fluid extract, every three or four hours as the case demanded.

EHRLICH'S 606.

Dioxydiamidoarsenobenzol. Is syphilis to be conquered? And is it to be conquered by a remedy which will obliterate all trace of this most virulent disease in a few weeks and with but one injection? Answer in the affirmative is made by a number of critical observers: namely, Wechselmann, Schreiber, Hoppe, Iversen and others, regarding this latest arsenic preparation brought forth by Ehrlich.

The new remedy is a sulphur-colored powder having the formula $C_{12}H_{12}O_2N_2As_2$ and is put up in small sealed tubes. Ehrlich uses the remedy in solution and injects it intramuscularly or directly into a vein. For intramuscular injection his technic is as follows:

(3) Jour. Am. Med. Assoc., Dec. 26, 1908.

1. 0.6 gm. of "606" are added to 3 c.c. of glycol. Stir with a glass rod, adding a few drops of water to hasten solution.
2. Now add 12 c.c. of water, shake, and add 10.3 c.c. of N/5 NaOH.
3. Now add distilled water up to 60 c.c.

This gives a clear solution of which one-half or 30 c.c. is injected deeply into the glutei muscles of one buttock and the remaining half into the opposite glutei.

An angry looking edema appears at the site of the injection and usually there is more or less pain. The pain may last from several hours to a week and seems to be aggravated by walking about; hence rest in bed may be enjoined following the injection.

The results following but one injection have been uniformly marvelous. The spirochetæ disappear from the blood in from 4 to 10 hours. All subjective and objective symptoms clear up within a week with no recurrence in the 2,500 cases so far treated.

The same results hold true for its use in relapsing fever caused by the *Spirillum Obermaieri*. Here the fever abates, accompanied by a profuse perspiration in 7 to 20 hours, with no collapse.

More recently Ehrlich and other observers have reported better results with less pain to the patient by using the remedy intravenously. Ehrlich's method of making the intravenous solution consists in the preparation of two solutions:—

A.—0.6 gm. Dioxydiamidoarsenobenzol.
0.5 c.c. Methyl alcohol or 3 c.c. glycol.
B.—240 c.c. of physiologic NaCl solution.
10.3 c.c. N/5 NaOH.

Mix solutions A and B with continuous stirring.

Too short a time has elapsed since beginning treatment with "606" for a definite determination of its value. It bids fair, however, to rank with quinin in its power to unite with and overcome a powerful pathogenic organism.

ELECTRICITY.

Effect of Electrical Currents on Blood Distribution. Geissler[4] describes a series of experiments undertaken to determine the effect of electrical currents on the distribution of the blood. One arm of the subject was placed in a plethysmograph which was provided with an index that

(4) Muench. med. Wochenschr., Jan. 14, 21 and 28, 1903.

recorded its excursions on a kymograph. One electrode was connected with the water in the plethysmograph and the other was applied either to the back of the neck or to one of the other extremities. Numerous precautions are necessary in carrying out these experiments and are detailed by the author. As the result of a considerable number of observations it was found that electrical stimuli produce a decrease in volume of the bloodvessels. This effect is produced both by galvanic and by faradic currents, and there is no difference in regard to the anode or cathode. Subject to individual variations, the degree of the decrease in volume depends on the strength of the current. Observations were also made on the blood-pressure and pulse-rate. It was found that in general both the galvanic and faradic currents gave rise to an increase in blood-pressure which once reached 14 mm., but was usually between 5 and 10 mm. The rise did not always correspond with the strength of the current. The behavior of the pulse was irregular, sometimes increasing, sometimes diminishing in frequency. The author believes that these experiments indicate that the heart and bloodvessels are susceptible to influence by electrical stimuli and that this may be made use of practically.

Electricity in the Treatment of Fractures. C. O. Files[5] believes that the processes of repair are essentially the same in fractures as in sprains, for all the vascular structures are repaired in practically the same manner. If the swelling and pain of a sprain are relieved and the inner tissues are cured by electricity, then the fractured bone will be restored by the same process. The swelling and pain—or, in other words, the inflammatory changes—are as unnecessary in a fracture as in an external wound. The conditions, in fact, are more favorable in a simple fracture, because there is no occasion for antiseptic treatment. The tight bandaging of a broken limb is an effort in the right direction, in preventing too much extravasation, and in favoring absorption; but the result is almost *nil* as compared with the efficiency of electricity. Moreover, the author says that in fractures there is a period of from seven to ten days, and sometimes longer, when there is no progress whatever in the work of repair. This time is spent in bringing to the parts an excess of material, and

(5) N. Y. Med. Jour., Jan. 30, 1909.

in laboriously absorbing that excess. The whole trend of knowledge in regard to the therapeutics of electricity goes to show that this period may be diminished, if not eliminated, and that the subsequent stages of the process of osseous regeneration may be hastened materially by the careful use of electricity.

Electricity in the Treatment of Carcinoma. Keating Hart, of Marseilles, described at the Electric Congress at Milan in 1906 a method of destroying cancer by the application of a powerful electric spark. His method—called sideration, fulguration, or lightning treatment—has been applied extensively in Paris by Pozzi, and Czerny[6] has given it a thorough trial in 35 cases. Although the interval since treatment is too brief for a definite conclusion, he is convinced that the method represents an important advance in the treatment of cancer. It can readily be applied by any Röntgen equipment. It is especially adapted for superficial, ulcerating cancers of the skin or mucous membranes, as it destroys the diseased tissues with an elective action while respecting sound tissue, and thus is more conservative than it is possible for the knife to be. Many patients submit more readily to this treatment than to an operation, and can thus be delivered earlier from their cancer.

Whether the cure from this technic is more permanent and recurrence rarer than after a knife operation cannot be decided until after five years. Treatment of recurrences will be easier by this technic than with the knife, if it is applied at the first signs of recurrence. It has the advantage of greater certainty and more rapid action in comparison with radium and the Röntgen treatment. Whether the fulguration acts on deep-lying cancers is still a question.

Czerny has modified Hart's technic to induce also what he calls fulguro-puncture and fulguro-lysis with bipolar application of the high-tension and high-frequency current. Hart's technic is to apply as powerful an electric spark as possible from a metal electrode at a distance of two, three, or four cm., focusing the spark at different points in the cancer, the entire exposure lasting from five or ten to forty minutes, with the patient under the

(6) Muench. med. Wochenschr., Feb. 11, 1908.

influence of an anesthetic. The radiated, softened cancer substance then is scraped out, and the lightning is applied again for ten or fifteen minutes to the raw surface, to destroy any possible cancer-nests that may have been left. The apparatus used by Hart can be attached to the Röntgen apparatus, using a 50 cm. inductor and Wehnelt interrupter. The electricity is conducted to a petroleum condenser with a spark interrupter and solenoid. This is connected with an Oudin resonator which can be arranged to send out a spark brush from 10 to 20 cm. (seven inches) long.

It is said that the total amount of electricity is not very large, so the actual electro-chemical action is comparatively slight. It seems to stimulate the connective tissue to granulation and normal growth. The powerful outward current of lymph that follows fulguration washes out the cancer cells, and brings an army of phagocytes to the spot; but if any cancer cells remain unaffected by the fulguration they are liable to continue to proliferate.

Static Electricity in the Treatment of Neurasthenia. J. H. Branth, in a paper presented before the Medical Association of the Greater City of New York, October 19, 1908, very carefully reviews the treatment of neurasthenia by means of static electricity and other methods of treatment.

He particularly emphasizes the fact that static electricity becomes a much better servant if used in connection with the proper remedies of the pharmacopeia. To rely upon electricity alone and by itself, he affirms, may often, like drugs alone, lead to failure.

Branth regards neurasthenia as nearly always accompanied by derangements of the great sympathetic nervous system. The vital functions and nutrition are presided over and regulated by it, and when its automatic action becomes disturbed, as in neurasthenia, it is impossible, by means of drugs alone, to re-establish a nervous equilibrium. Branth affirms, however, that by stimulating the sympathetic nervous system by means of static electricity, the processes of nutrition will become more active, and medicines will produce better results.

Branth describes an ingenious experiment that proves that static electricity penetrates living tissue rather than

accumulates upon the surface of the body, as has been affirmed by several physicians. Upon the spread fingers and hand of the operator is placed a thick rubber plate. Upon this plate is placed a glass containing water. An electrode attached to the secondary terminal of a Tesla coil, excited by means of a static machine, is held in the water. The other terminal of the coil is grounded. The static machine is set in motion, and the discharging rods are separated as widely as the Leyden jar condensers will permit. It will be seen that the spark will pass directly through the water and hand in its path to the earth, rather than spread itself over the outside of the conductor.

Branth affirms that all vital processes may be stimulated by means of static electricity. The current may be sent directly through the trunk, and so through the solar plexus, innervating the stomach, liver, spleen, and intestines, and the ganglia innervating the kidneys and pelvic organs. The processes of assimilation are enhanced thereby, and the absorption of medicines greatly accelerated.

Branth says: "Static electricity is Nature's safest and most rational remedy for stimulating healthy metabolism. We all know that some forms of electricity act as a powerful stimulus to nerve and muscle, and so rapidly impart tone, buoyancy, and firmness to relaxed and enfeebled tissue. Electricity stimulates the glandular organs to greater functional activity and is equally powerful in increasing cellular activity, favoring the elimination of waste and residual poisons, obviating auto-intoxication, so that new nourishment may be taken up by the cells."

Static Electricity in Genito-Urinary Diseases. F. H. Bermingham carefully reviews the therapeutic effects and physiologic action of the various electrical modalities in genito-urinary affections, and in reference to static electricity says: "The static and high-frequency currents have their use in the neurotic patients, and of very great use they are."

In the treatment of prostatic hypertrophy, Bermingham commends the Morton-wave current. The patient is placed upon the insulated platform in a reclining chair or on a table, a metal electrode is placed in the rectum in close contact with the prostate, attached to the positive side of the static machine, the other side being grounded.

Then the machine is started at a moderate rate of speed, the discharging rods being separated until the patient complains of discomfort. The amount of discomfort complained of will be in proportion to the amount of congestion present. In acute congestion of the prostate, the spark-gap can be opened but a short distance without causing considerable pain; but the discomfort soon subsides. In acute conditions, a spark-gap of two inches or more can be used.

Bermingham says that this modality, if properly carried out, forces pent-up secretions from the gland, and removes products of infiltration. It causes tissue contraction, and excites peristaltic contraction, and will reduce the gland more thoroughly than massage.

Static Electricity in Gynecology. J. W. Torbett, in a valuable paper presented before the State Medical Association of Texas, May 14, 1909, reviews the diagnosis and treatment of some of the more common gynecologic cases.

In the treatment of dysmenorrhea in the virgin, Torbett advises the use of the static-wave current. The patient is placed in the Sim's position on a reclining chair, which is likewise placed upon an insulated platform. A metallic rectal electrode having an insulated handle is warmed and lubricated. It is inserted in the rectum back of the uterus. The electrode is either held by the patient or by means of an *x*-ray tube-holder in such a position that it is pressed firmly forward against the uterus. The electrode is attached to the positive side of the static machine. The negative side of the machine is grounded. The machine is started with a very short spark-gap. The discharging rods are separated gradually until a spark-gap of from one to four inches is tolerated by the patient. The treatments are to be continued twenty minutes daily between the menstrual periods. Torbett affirms that most cases may be cured in a period of four months.

This treatment, Torbett says, has a profound effect upon the general nervous system and upon the circulation, relieving local congestion and stasis, and hence is useful in those cases due to local congestion and moderate flexion. In a very small proportion of cases caused by extreme flexion and tumors, the treatment is of little value.

In the treatment of dysmenorrhea in the married, Torbett advises a more thorough examination, as these cases may be complicated with acute or chronic inflammation of the uterus or its appendages. In this class of cases, Torbett affirms that the stenosis is treated best by means of the continuous current. A copper intra-uterine electrode is inserted in the uterus, and is connected with the negative side of the battery or switch-board. The positive side is attached to a large abdominal pad well saturated with a saline solution. The current strength is from 10 to 20 ma. twice a week. The duration of the seance is from five to ten minutes. If the dysmenorrhea is the result of endometritis, complicated with menorrhagia, Torbett advises substituting the positive intra-uterine copper electrode for the negative. In this class of cases, Torbett also suggests the use of the topical application of a 10 per cent. solution of ichthyol in glycerin, to be applied freely over the endometrium. To accomplish this end, a strip of gauze placed over the end of an intra-uterine syringe is introduced within the uterine cavity. The ichthyol-glycerin solution contained in the syringe is then forced out.

ENZYMES.

Enzyme Treatment of Cancer. Bainbridge[7] refers to his preliminary reports on the enzyme treatment of cancer and draws the following deductions: 1. The internal medication with holadin and oxgall aids digestion and increases elimination. 2. *Lotio pancreatis* applied locally clears the ulcerating surface by removing organisms, thus aiding in diminishing the absorption of their products. 3. Aiding digestion, increasing elimination (by skin, kidneys and bowels), and decreasing local absorption, are the most important features of the treatment. 4. The régime, by increasing resistance, may in some cases decrease the rapidity of the malignant process. 5. The patients of control-cases given injections of glycerin and water or sterile water alone, plus the régime, did as well as those on the full enzyme treatment.

6. *Injectio trypsini*, in some cases, seems to cause more rapid disintegration (to "liquefy," according to Beard) of

(7) Brit. Med. Jour. and N. Y. Med. Jour., March 2, 1907.

cancerous tissue. 7. While it may accelerate the breaking down in the center of the tumor mass, the periphery is found to be actively growing. When injected into the tumor itself this disintegration is more marked. 8. Because of the tendency of *injectio trypsini* to disintegrate the tissues, it may be a direct menace to life, (a) by eroding large bloodvessels (when the disease is contiguous to these structures, as when deep in the neck or in the pelvis), thus causing death from hemorrhage; or (b) when given in large doses, over considerable periods of time, it may hasten death by overwhelming the system with toxic products (tumor toxins). 9. The injections are often painful, and patients many times refuse to take them. 10. The so-called "trypsin abscess" proved, upon examination of the material, to be unabsorbed *injectio trypsini* plus broken down tissue. 11. When real abscesses formed they were due to faulty technic, to localization of a general sepsis resulting from the absorption of toxic products, to an accompanying sepsis of various origins, or to a complicating acute infection.

12. *Injectio amylopsini* seems to diminish cachexia in some cases. 13. In some cases there was no reason to believe that *injectio amylopsini* exerted the action claimed for it. 14. When amylopsin was injected directly into the indurated area left after injecting trypsin, absorption of the trypsin solution was not hastened. 15. One hundred minims daily of the *"quadruple x"* solution, the strongest made, were given in some cases with no untoward effects. 16. Improvement in hemoglobin (5 to 12 per cent.) during the first few weeks of trypsin treatment occurs in about one-sixth of the cases examined. In only one-third of these was the increase ascribable to the trypsin alone.

17. A gradual and moderate increase in the number of polymorphonuclear neutrophile cells was noted during the first two weeks of the trypsin treatment in a few of the cases. 18. With the exception of 2 cases such leucocytosis as was noted was attributable to the occurrence of complications during the first two weeks of trypsin treatment. 19. In 15 out of 22 cases a steady increase (6 to 12 per cent.) in the number of eosinophile cells was noted while patients were on the trypsin injections. There was no eosinophilia in the control-cases, nor in the cases treated

by trypsin given by the mouth. 20. Eosinophilia occurred regularly in cases of carcinoma involving the bones or the intestines, even without the exhibition of trypsin. 21. The claims for eosinophilia as a test have not been substantiated in his experience.

22. Albumin and casts were found in the urine before treatment was begun in 2 cases. In neither of these was the amount of albumin or the number of casts increased at any time during the continuation of the trypsin injections. 23. In severe cases, in the very last stages of the disease, hyaline, granular, and a few pus casts, and occasionally albumin made their appearance. 24. In 2 other cases in which it was impossible to obtain specimens of urine before beginning the treatment, albumin and casts were present when the cases came under examination; and as the trypsin doses were increased the amount of albumin and the number of casts were increased. 25. Dextrose was at no time found in any of the urine specimens examined, not even when untoward manifestations of trypsin were present and large doses of amylopsin were being given.

26. The series of experiments which were conducted for the purpose of ascertaining the presence or absence of an enzyme in the urine with properties of digestion similar to trypsin, showed the presence of such an enzyme body (irregularly present) in (a) trypsin-treated cancer cases; (b) non-cancerous untreated cases; (c) cancer cases which had not received the trypsin treatment. 27. The exact constancy of this enzyme body in the urine with reference to the treatment was not ascertained. No enzyme body was found in the urines in which there was ammoniacal decomposition.

28. The enzyme treatment as administered in his patients, and according to the suggestions of Beard, plus important details of régime, does not check the cancerous process. It does not prevent metastasis, and it does not cure cancer.

Trypsin in the Treatment of Cancer. Golley[8] reports 2 cases of cancer treated with trypsin, and concludes that this drug exerts some influence upon the metabolism of the general system, and indirectly upon the growth. It

(8) Med. Record, May, 1909.

is a self-evident truth, he remarks, that, if the organism can be maintained indefinitely at a sufficiently high standard, it will not only not be subject to the onslaughts of disease, but will live on for all time. It is upon this element, to a very moderate degree, in his opinion, that depends whatever influence the trypsin treatment has over cancerous growths. Somehow it influences the metabolic processes particularly, and establishes a resistance to the cell activity of malignancy.

ERGOT.

Ergot in Obstetrics. The results obtained from experiments lead Cronyn and Henderson[9] to advise the use of ergot in certain emergencies; namely, in shock and postpartum hemorrhage. In both these cases, these authors use the drug intravenously; but the effect should be watched carefully, and care taken not to repeat the dose too frequently. They conclude also that:—

1. Most preparations of ergot contain a considerable amount of the active principles, but do not show any great or marked action when given by mouth. The usually recommended doses are much too small.

2. Ergotoxin is a highly active alkaloid, and has the properties of ergot most desired in medicine.

3. Ergotoxin brings about a long-enduring contraction of the walls of arterioles, and increases the movements of the uterus.

4. This action is feeble when ergotoxin is given by the mouth, but more marked in subcutaneous injections, and much more marked when given intravenously.

5. In cases in which a rapid and certain action is desired, either in shock or in postpartum hemorrhage, they recommend intravenous administration. They recommend further, if the effect prove too evanescent to achieve the results desired, that suprarenal extract be administered subsequently in repeated small doses.

Ergot in Acne Rosacea. Robinson[1] refers to the writings of A. T. Livingston in reference to the use of ergot in other than obstetric conditions, and says that during

(9) Jour. Pharm. and Exp. Therap., August, 1909.
(1) Med. Record, July 11, 1909.

the past seven years he has used ergot hypodermically with gratifying results in over three hundred cases of acne rosacea. He used the deep gluteal injections, and reports 3 cases selected from many of various kinds illustrative of its uses. They represent respectively acne rosacea, varicose veins in an obese, aged woman, and extreme nervousness with defective venous circulation associated with excessive cigarette smoking.

ETHER.

Engstadt[2] has found that ether is a good antidote of cocain and stovain poisoning. It should be administered in the same manner as ordinarily given to produce surgical narcosis. Ether stimulates the vasomotor system, is a tonic to the heart muscles, stimulates the action of the respiratory centers and those of the brain and of the pneumogastric nerve, and increases the pulmonary circulation in the first stages. While cocain inhibits the action of the heart, especially on the right side, it has also a marked inhibitory action on the respiratory centers of the brain. Death may occur from feeble respiratory movements of the so-called Cheyne-Stokes type, or asphyxia. Ether stimulates the heart and the respiratory system almost instantly. The pulse becomes fuller at once and of normal tension.

The marked mental excitement is allayed as the patient goes under the influence of ether, and the effect of the poison rapidly disappears. The individual regains consciousness as soon as the effect of the small amount of ether has disappeared. To get the best results, the anesthetic is administered only to the degree of mild surgical narcosis, or, at times, even less than this. A mask should be employed, and the ether given by the drop method. This is all-important. Given by the old method, the ether only adds to the danger of asphyxia by excluding air from the venous blood-engorged lungs.

FIBROLYSIN.

Fibrolysin in Pleural Adhesions. Schnulgen[3] calls attention to the deposition of fibrin that takes place after

(2) Jour. Am. Med. Assoc., Mar. 19, 1910.
(3) Brit. Med. Jour., Feb. 27, 1909.

the more or less complete absorption of a pleural effusion. This leads to adhesions between the two layers of pleuræ, and thus binds down the lung to the chest wall or the diaphragm. The author points out that when this affection is recurrent, as is the case in tuberculosis, an induration of over half an inch in thickness may be formed. The effects of such adhesions and induration upon the pulmonary circulation need no special description. The clinical symptoms of such adhesions are diminished breath sounds, loss of vocal fremitus, and dullness on percussion. Pain is complained of. Subjective symptoms, however, may be very slight. The treatment usually adopted in such cases is painting the chest with iodin, applying iodin-vasogen, and lung gymnastics; but the results of these forms of treatment are rarely apparent. When gymnastics are combined with fixation of the healthy lung, by means of pneumatic apparatus, better effects are obtained.

Since fibrolysin (thiosinamin and sodium salicylate) has been recommended highly within recent times for a large variety of internal and external scar-formations, the author determined to try it in pleural adhesions. He used Merck's preparation, which contains 2.3 cc. of fibrolysin in each capsule, and injected this dose either locally or in the gluteal muscles. The injections were repeated once or twice every week, according to the severity of the case. In the majority of the cases, the injections were painless, and the only undesired effects were occasional slight rises in the temperature, slight feelings of fatigue, and headache. The objective and subjective symptoms diminished markedly, and in some cases with extraordinary clearness.

In reviewing his cases, he states that fibrolysin given immediately after the effusion is completely absorbed and signs of beginning pleural adhesions can be made out, is often followed by good results, and should therefore always be tried.

Fibrolysin in Arthritis Deformans. Althoff[4] reports a case in which fibrolysin was used *per rectum* for the treatment of arthritis deformans, and a second in which it was used *per vaginam* for a retroflexed uterus. The first patient seemed to have an idiosyncrasy against fibrolysin; but many small doses given by the rectum were borne, ab-

(4) Muench. med. Wochenschr., Aug. 3, 1909.

sorbed, and produced a decided improvement both subjectively and objectively.

In the second case, the adhesions that held the uterus in a retroflexed position were dissolved by a mixture of ichthyol, glycerin, and fibrolysin into the vagina, so that at the end of six weeks the uterus could be moved about and brought into an anteflexed position. He urges further trial of the rectal and vaginal use of fibrolysin, but advises one to begin with small doses, and gradually to increase them.

Fibrolysin (Thiosinamin) in Tabes. Müller[5] noticed that a tabetic patient who had been treated with fibrolysin for urethral stricture felt much relieved from the torturing pains in his lower extremities, whereupon he tried the remedy systematically on 11 other tabetics. In the latter cases he did not use the ready-made preparation, fibrolysin, but the following solution:

Thiosinamin	Gm. 10
Sodium salicylate	Gm. 20
Glycerin	Gm. 10
Water (sterile) q. s. ad.	Gm. 100

Of this solution Müller injected into the gluteal muscle fifteen minims every other day, and in some cases even every day, without the least pain or untoward effects resulting. The patients received, at the same time, iodin in the form of potassium iodid or sajodin in very small doses. Every one of these patients thus treated experienced considerable relief from his torturing pains. In one case the paroxysmal violent gastric pains disappeared, while in another irritation of the bladder and rectum was removed. Some laryngeal trouble in a third patient also became somewhat better. Improvement was noticed comparatively more quickly in the 6 bladder cases, these being completely relieved from urine retention, while urination became easy. The general condition was very markedly improved in all. This improvement may be ascribed to the relief from pain and consequently better sleep. The ataxia of the lower extremities was relatively less influenced. The objective diagnostic symptoms remained wholly uninfluenced.

In view of all these facts, which were clearly established,

(5) Med. Klin., 1909.

it is no exaggeration to say that thiosinamin is a valuable aid in the treatment of tabes. Furthermore, it should be stated that the patients thus far treated, with three exceptions, were in very poor circumstances, so that most probably in private practice and with better nourishment, besides the various modern, well-proven physical methods (rest-cure, etc.) still better results could be achieved. At least forty injections should be given.

HYDROTHERAPY.

Hydrotherapy in Scarlatina. D. S. Hanson[6] advocates the use of the tub bath at 90° F. early in the treatment of scarlatina, especially in the severe toxic cases, for the nervous symptoms, although in patients with high temperatures in whom severe nervous symptoms are lacking the benefits are nearly as marked. He gives the bath for from five to ten minutes, using at the same time, gentle friction to the body surface. The bath is repeated as often as necessary to control symptoms and temperature. He has used it in this way, sometimes as often as every two or four hours for three or four days. If a bathtub is at hand the patient may be lowered into it, lying on a sheet, but in his cases an ordinary washtub was employed. In order that the thermogenic process may not be interfered with seriously, it is necessary that the body be protected after coming out of the bath.

Hydrotherapy in Arteriosclerosis. Martinet[7] says that in arteriosclerosis baths of all sorts should be at a temperature between 34° and 36° C. Hot baths are dangerous, because their primary effect is an elevation of the arterial tension, which may cause a rupture of an affected vessel in the brain or elsewhere. Cold baths of all sorts should also be interdicted rigorously. The wet pack at night, preceded and followed by friction, is of great value. Baths of electric light applied to different parts of the body in succession form an efficacious means of dilating the cutaneous vessels, and of relieving the tissues of the products of metabolism.

Effects of Hydrotherapy on the Heart. Selig[1] stud-

(6) Jour. Am. Med. Assoc., Oct. 17, 1908.
(7) Presse Méd., Dec. 26, 1908.
(1) Berlin. klin. Wochenschr., May 31, 1909.

ied the size of the hearts of a large number of patients before and after various kinds of baths. Grödel's orthodiograph was used. The results were as follows:

Hot fresh-water baths caused a decrease in the cardiac area and an increase in the pulse rate, while cold baths caused the heart to increase in size and the pulse to be slower. Both hot and cold baths caused a reduction of blood-pressure. Hand-baths, of which only two were given, caused the opposite effect on the heart. The cold bath reduced and the hot bath increased the size. Local applications of the hot and cold water to the cardiac region gave variable and uncertain results as to the heart size; but the cold caused a decrease in the pulse rate, and a rise of blood-pressure. Carbonated baths were also used. These were found to be variable as to the effect on the size of the heart, though they caused a slight increase in blood-pressure and a lowering of pulse rate.

Hydrotherapy in Neurasthenia. Fürstenberg[2] states that hydrotherapy, rightly used, is capable of excellent results, not only in the treatment but also in the prevention of neurasthenia. But it is necessary that the individual procedures be chosen so as to correspond in their strength with the desired stimulation, as the entire result depends on the exact dosage of this stimulation.

Keller[3] outlines a course of treatment for neurasthenia such as can easily be conducted at a clinic or in private practice with little or no expense to the patient. He says that before commencing to treat these patients the physician must rid himself of the impression that neurasthenics suffer from imaginary ills. It is true that they complain of pains far out of proportion to the severity of the illness, but as a matter of fact, these patients are ill. There is something that really pains or irritates them, and on account of their introspective tendency, they exaggerate all these symptoms.

After having completed the history, a physical examination should always be made, although the physician may feel certain that he will derive no further information. The treatment proper may be divided into hygienic, dietetic, and medicinal. The physician should therefore insist

(2) Med. Klin., June 13, 1909.
(3) N. Y. Med. Jour., July 10, 1909.

that such a patient spend a few hours every pleasant day in the open air. He must walk, as this not only gives him the fresh air, but also the best of exercise. A cold daily bath on arising is very beneficial for those who can stand it. But many can not endure this rigid and frigid treatment, and furthermore many have not the luxury of a private bathtub. In these cases, a cold pack, or a cold douche (applied for about one minute at the outset and gradually increasing the duration) followed by vigorous friction, can be substituted with benefit. A towel dipped in cold water, held by the patient or another person over the shoulder and squeezed out, produces all the benefits of a spinal douche. A warm bath before retiring will allay restlessness and benefit insomnia.

Almost all neurasthenics are constipated. These patients must be instructed how to form a proper habit so that the bowels will move without medication. They should be advised to go to stool every morning just after arising. A glass of cold water on an empty stomach aids peristalsis. They should go to stool whether they have any inclination to move their bowels or not, and remain ten, fifteen, or even twenty minutes until there is a movement.

Diet is an important question with these patients. Tea, coffee and alcoholic drinks must be eliminated, as they tend to increase the nervousness of the patient. Tobacco must be restricted for the same reason. No specific diet can be mentioned, but each individual case must be treated along individual lines. As a general rule, the patients need nourishing foods to build them up. Fried foods should be avoided, as they tend to upset the stomach and to cause constipation. Fruits that leave large residues may be allowed on account of their laxative effect.

The medicinal treatment consists mainly of sedatives and tonics. The following formula Keller finds very effective in allaying the nervousness, sleeplessness, headache, etc.:

℞

	gm. or c.c.	
Potassium iodidi	33	gr. v
Potassium bromidi	66	gr. x
Ammonii bromidi	26	gr. iv
Sodii bicarbonatis	39	gr. vi
Tincturæ nucis vomicæ	52	m. viii
Tincturæ gentiani co.		
Aquæ destillat., q. s. ad	8	ad 3ii

When this combination fails it is then advisable to give,

in addition, some form of valerian. A pill made of 1 grain each of the valerianates of quinin, zinc, and ammonium will allay nervous symptoms. When the patient's bowels are regular, the nervousness abated, and the headache and sleeplessness gone, it is then proper to begin tonic treatment, which must be kept up for eight or ten weeks or longer if necessary. Arsenic in the form of Fowler's solution or in tablets containing arsenous acid probably produces the best results. Strychnin (or nux vomica), quinin and iron may be added, each separately or in combination.

HYOSCIN.

Hyoscin in the Treatment of Drug Habits. Riewel[4] summarizes his views as to the value of hyoscin in drug habits, and concludes as follows:

1. The hyoscin treatment will eliminate the desire of drug and alcohol habitués for these drugs, thus eliminating the element which prevents the patient abstaining by force of will power.

2. Having lost the desire, they do very well without intoxicants or the drugs, as shown by the increase in appetite, gain in flesh, and their general improvement.

3. The question of relapse lies entirely in the sincerity and environment of the patient.

4. The favorable alcoholic addicts are those who earnestly desire to discontinue the use of intoxicants, and are willing to change their mode of living and environment, but who cannot until relieved of the craving for liquor.

5. Relapse in both drug and liquor cases is not due to desire or suffering after the treatment, but to curiosity to test the necessity of total abstinence, or to the temptations of social life.

6. A single dose of the drug or drink of liquor, even after one year of total abstinence, is very apt to start the craving, resulting in a condition which is no better than before treatment.

7. This method may prove a valuable treatment in apparently hopeless cases of opium poisoning. Interesting experiments along this line might be carried out.

(4) Monthly Cyclopedia and Med. Bull., October, 1909.

8. The one contra-indication for this treatment is the presence of Bright's disease.

9. No patient should be treated unless put to bed and watched by competent nurses day and night during the first week.

The Hydrobromids of Hyoscin and Scopolamin in Refraction Work. W. Reber[5] gives his experience with hyoscin hydrobromid and scopolamin hydrobromid in refraction work, and more particularly the results of some experimental tests as to the effects of these drugs upon the pupils and upon accommodation, respectively. Of the two salts, that of hyoscin seems to be the more effective, the relative pharmacodynamic power as used in ordinary office work being given by him as somewhere near 59:92. In other words, hyoscin showed itself in these experiments to be approximately 50 per cent. more potent than scopolamin in producing cycloplegia for refraction work. The experiments thus confirmed his opinion formed by clinical observation which had led him to suspect the inferiority of scopolamin.

During the last six years Reber has used 1/10 per cent. solution of hyoscin hydrobromate (1 2 grain to the ounce), containing cocain also in the strength of 1/5 per cent., in something like 2,000 cases of refraction in private practice, without once seeing any pronounced toxemia. In about 1 case in 50 there was some flushing and quickening of the pulse with slight vertigo, which he attributes to the failure of the patient to press tightly over the canaliculus after the drug was instilled. He has used it as freely in small children as in adults. Customarily he has the solution instilled once or twice the evening before, and twice on the morning of the consultation. For office instillation the use of the solution is preceded by one drop of a 2 per cent. cocain solution, warmed like the hyoscin drops. Two hyoscin instillations are made half an hour apart; and at any time one or two hours after the first instillation the refraction may be satisfactorily tested in the vast majority of cases. Accommodation sufficient for everything but the most exacting near work is generally re-established by the end of from forty-eight to sixty hours.

(5) Jour. Am. Med. Assoc., Apr. 25, 1908

IODIN.

Iodin in Tuberculosis. Leonardo[6] discusses the history of iodin in the treatment of tuberculous affections and describes microscopic examination of the tissues after local or general injections of an iodo-iodid solution in tuberculous and various other lesions, from a total of 22 cases. His findings show that iodin has a distinct action on tuberculous tissue, but that this action differs according as the drug is injected locally or not. In general injections it has a general tonic effect, raising the opsonic index. When injected directly into a tuberculous focus it induces a local irritative process and consequently attracts to the spot both leucocytes and serum, and thus a larger quantity of bactericidal and antitoxic substances.

Tatchell[7] says that the most common disease in China is tuberculosis of the joints, bones, glands, and skin. He has found that after operative treatment the application of iodin liniment has a remarkable effect, and he selects one case of excision of the elbow as an illustration. After operating or scraping, the cavity is swabbed thoroughly with iodin liniment (B. P.). A piece of absorbent cotton twisted around the end of a probe forms a good swab, and can be graduated according to the size of the sinus. The liniment is applied every day. The application does not cause pain other than a momentary sensation when applied to some surfaces. Neither does it destroy tissues, as does pure carbolic acid. Granulations do not become excessive. At the first application, he inserts a thin piece of gauze, or packs lightly, but never at subsequent dressings. Gauze plugs and strips for drainage have undoubtedly been responsible for many chronic sinuses. From the first he gives internally a mixture containing syrup of iodid of iron, one dram, and potassium iodid, five grains, three times a day.

Iodin in Thyroid Enlargements. Marine and Lenhart[8] summarize the results of their experiments with iodin in enlargements of the thyroid gland, and conclude as follows:

(6) Policlinco, June, 1909.
(7) Brit. Med. Jour., Feb. 13, 1909.
(8) Archiv. Int. Med., September, 1909.

1. The tendency of all active hyperplasias is to revert spontaneously to colloid glands, and this change is hastened or delayed by the presence or absence of iodin. The amount of iodin given is of little consequence in normal and colloid glands, but is of the greatest significance in active hyperplasias.

2. The ability of the glands to take up iodin does not depend so much on the form, mode, or amount of its administration, as it does on the degree of active thyroid hyperplasia.

3. There is a minimum amount of thyroid tissue below which iodin does not protect against compensatory hyperplasia. This limit is roughly the same whether colloid or normal gland.

IODIPIN.

E. Lustwerk[9] states that he prefers the subcutaneous administration of iodipin. The following cases were treated by him:

1. *Gonorrheic sciatica.* The sciatic nerve was tender and palpable after several attacks of gonorrhea. After five injections, each of 10 cc. of 25 per cent. iodipin, there was much improvement. The patient was cured after ten more injections.

2. *Syphilitic optic neuritis.* Within three months a total of 450 cc. of iodipin, given in doses of 15 cc. every other day, brought about marked subjective and objective improvement, and also favorably affected an existing myocarditis.

3. *Tabes dorsalis.* The most pronounced symptoms were the lancinating pains. After 25 intramuscular injections of 15 cc. each, the pains, hyperesthesia and ataxia had disappeared, so that the patient could again take up his vocation.

4. *Struma.* Syrup of iron iodid and the application of iodin were ineffectual; but 50 cc. of iodipin injected in 5 cc. doses every day, led to a complete disappearance of the tumor.

5. *Acute, traumatic gonitis,* in a patient sixty years

(9) Deutsche med. Zeitung, 1909.

old, was cured by 2 cc. injected every other day near the knee for twenty doses.

6. *Empyema.* The suppuration could be checked by evacuation of the pus, but a cure was not established until several doses of 15 to 20 cc. of a 25 per cent. solution of iodipin had been injected.

7. *Bronchial asthma.* The usual mixture relieved the attacks, but iodipin given in tablet form seems to have cured the disease.

8. *Arteriosclerosis.* All symptoms improved after 10 cc. of iodipin had been injected every other day for a month and a half.

9. *Transverse dorsal myelitis.* A daily injection of 20 cc. of iodipin for six weeks, and every other day for two more weeks, completely cured the patient.

IRON.

Use and Abuse of Iron. Eustace Smith[1] says that to take anemia as a sure guide to the immediate use of iron is to fall into one of the commonest of errors. To get any benefit from such a remedy, the tongue must be clean and the digestive organs in a healthy state. Preliminary antacids and stomachics are called for and then the iron will be beneficial. Often in chlorosis there is considerable tenacious mucus in the stomach, and the use of an emetic will help far more than the routine administration of aloes and iron. Any benefit which may result from the latter combination is probably due to the laxative ingredient. It is often advantageous to begin the treatment of anemia with the ammonio-citrate salt in some bitter infusion, changing to a stronger iron preparation as the tongue grows cleaner.

The author enumerates certain of the B. P. iron preparations which he has found useful in various clinical conditions. He closes by saying that the chalybeate salts, when given with judgment, are remedies which we could ill spare, but the indiscriminate use of these preparations is to be deprecated. Iron must not be regarded as an infallible specific in every form of anemia. The cases for which it is curative must be chosen with judgment, and

(1) Brit. Med. Jour., Oct. 17, 1903.

every care must be taken to see that the digestion is in a condition to profit by the remedy. Any sign of irritability of the stomach is to be taken as an indication that the stronger preparations are to be avoided, and even the milder salts, the tartrate and the ammonio-citrate, should be prescribed timidly and only in conjunction with an alkali, such as citrate of potassium or the aromatic spirit of ammonia, in a freshly-made bitter infusion. If the tongue be clean, or merely flabby and pale, showing indentations of the teeth at the sides, the stronger salts may be prescribed with confidence, and the dose may often be pushed with advantage, if aperients are given from time to time as already recommended.

Iron in Treatment of Pneumonia. The exact treatment carried out by Thompson[2] in pneumonia consisted in giving the following prescription:

℞

	gm. or c.c.		
Liquoris ferri chloridi	1	or	m.xv.
Liquoris ammonii acetatis	4		ʒj
Aquæ chloroformi, ad	30		ʒj

Sig.: Every four hours.

No other drugs or stimulants are administered, with the exception of a purgative to open the bowels freely at the commencement of the disease.

A careful watch is kept on the heart, and if this shows signs of collapse as indicated by a weak and quickened pulse, then cardiac stimulants are called in to aid the failing circulation. The pulse is not relied on alone because it may be full and not much quickened just before death. When necessary, the following prescription is ordered:

℞

	gm. or c.c.		
Liquoris strychninæ	33	or	m. v.
Tincturæ digitalis	46		m. vii.
Aquæ chloroformi, ad	30		ʒi.

Sig.: Every six hours.

This is given alternately with the iron mixture every six hours; that is, four doses of each in twenty-four hours. The number of patients treated with iron alone was 6. The remaining 4 needed the addition of the strychnin mixture. No patient received anything but iron before the fifth day. Besides these medicines, general principles were followed in the management of the cases.

(2) Indian Med. Gaz., June, 1909.

LACTIC ACID.

Heinemann[3] summarizes the matter of lactic acid as an agent to reduce intestinal putrefaction as follows:

The usefulness of lactic acid or lactic ferments as curative agents for intestinal putrefaction is still problematical. Much evidence in its favor has accumulated of late years, and it is desirable that exact scientific investigations of a decisive character be undertaken. The evidence in favor of the use of *B. bulgaricus* as a lactic-acid-producing organism for the purpose of arresting intestinal putrefaction is not convincing. The association of *Streptococcus lacticus* with the Bulgarian bacillus leaves doubt as to which one of the two organisms is the one responsible for the beneficial effects claimed. The Bulgarian bacillus produces a disagreeable taste of decomposition in milk.

Lactic Acid Buttermilk. H. Emerson[4] says that the use of soured milk is based on three distinct properties: 1. Pathogenic bacteria do not thrive in a medium that has a marked degree of lactic acid. 2. The process of carbohydrate and proteid disintegration occurring in the souring of milk makes a softer, more digestible and smaller casein curd, and a carbohydrate in a state of partial digestion. 3. Lactic acid activates peptic secretion and digestion.

If we are to use soured milk, the following are the desiderata: 1. The milk must be clean, and undiluted. This is a prerequisite if we wish to avoid the necessity of pasteurizing or sterilizing the milk before we start the process of souring. 2. The milk should be skimmed fresh, preferably by mechanical centrifugal separation immediately after chilling, subsequent to milking or during the process of chilling. 3. If the milk is not free from pathogenic or putrefactive bacteria it must then be sterilized to put an end to the growth of pathogenic and putrefactive bacteria, and to enable us to control the results of our subsequent inoculation without the interference of undesirable organisms. 4. The milk should then be im-

(3) Jour. Am. Med. Assoc., Jan. 30, 1909.
(4) N. Y. Med. Jour., Feb. 8, 1908.

oculated with an exact dose of biologically standardized bacteria. Probably the inoculation with bacteria should be accompanied by inoculation with known cultures of yeasts.

The yeast is necessary: 1. To inhibit the overgrowth of pathogenic and putrefactive bacteria; 2, to add flavor which cannot be obtained without it, presumably by the production of aromatic substances such as esters; 3, to attack milk sugar after lactic acid has been formed in the milk, and produce alcohol and carbonic acid gas, which are valuable assistants in the digestion and absorption of milk, and in causing the milk to be tolerated by an irritable and congested mucous membrane.

Buttermilk. Koeppe[5] declares that the superiority of buttermilk in ions adapts it better for infant feeding than cow's milk. Human milk contains little albumin, little ash and large proportions of ions; cow's milk, much albumin, much ash, few ions; while "buttermilk gruel" contains much albumin, much ash and quantities of ions. Cow's milk contains casein in the form of casein salt, while in buttermilk it is in the form of casein acid, which explains its greater digestibility. He regards the introduction of buttermilk into infant feeding as not only a progress in respect to practical results, but also in the deeper insight it allows into the desiderata of infant feeding. He approves of buttermilk gruel, which is made of sour cream, the acidity not too pronounced. The buttermilk must be fresh each day; one liter is mixed with 60 gm. of cane sugar and 15 gm. of wheat flour, is boiled up three times and then distributed in sterilized bottles, each representing one meal. The ions in the buttermilk evidently cause inversion of the cane-sugar to some extent.

LECITHIN.

A review in *Modern Medicine* calls our attention to a work upon lecithin, by Duberge, recently published in Paris. The author gives his views on methods of administering lecithin, its indications and contra-indications, and his experience in a large number of cases. He also devotes a chapter to the use of lecithin in the military and

(5) Deutsche med. Wochenschr., June 15, 1909.

naval service, also in overfeeding.

The dose usually employed by adults is from 15 to 30 cgr. (2½ to 5 grains). A dose of 15 cgr. may be continued for months if the patient does not eat too many eggs. With this dose, in connection with the suralimentation of the tuberculous, we frequently find the patient gaining four or five pounds a month. The author gives children proportionately larger doses than he does adults. The effect of the overdose is most marked on the genito-urinary organs, as if they were congested.

Duberge finds lecithin an excellent remedy for nervous diseases in which asthenic conditions are present, such as neurasthenia and feebleness following overfeeding. It is useful in anaphrodisia and ovarian insufficiency, also in chorea.

Lecithin is an excellent galactagogue, increasing the secretion of milk, and rendering it more nourishing.

Administered during pregnancy, it may be useful to the fetus, preventing rickets. Lecithin, however, may be the cause of a serious increase in the size of the child, and may give rise to hemorrhages and abortion.

Lecithin is an excellent remedy in anemia, improving assimilation, combating lymphatism and anorexia, and especially nourishing the nervous system.

During convalescence, in diseases of the digestive organs, or in cases where for some reason or other the patient cannot be sufficiently nourished by ordinary means, lecithin, added to the diet or administered by intramuscular or hypodermic injections, is an excellent supplementary food, and prevents emaciation.

Lecithin is an excellent preventive remedy for those who have a tendency to tuberculosis. It is also an excellent curative medicament in this disease. It is an excellent nutriment. It improves assimilation, and assists in taking care of the increased amount of food needed in those cases. Lecithin is also useful in the cases of aged persons who are fed with difficulty, and also in cases of difficult or long convalescence.

Bacteriolytic Action of Lecithin. Bassenge[7] says that emulsions of lecithin are to a pronounced degree lytic for typhoid bacilli. When brought into contact with a 1

(7) Deutsche med. Wochenschr., Jan. 23, 30, and Feb. 6, 1908.

per cent. water emulsion of this substance, the bacilli immediately disintegrate. The organisms first shrivel and then break up into separate, highly refractive granules, as in Pfeiffer's experiment. In a 1 to 1,000 emulsion this result did not follow at once; and even at the expiration of thirty to sixty minutes, in addition to the shriveled and disintegrated bacilli, well-preserved and motile organisms were present. A 1 to 10,000 emulsion manifested only traces of bacteriolytic power. Cultures made from these emulsions remained sterile at the strength of one per cent., and there was manifest inhibition in that of 1 to 1,000, while the 1 to 10,000 emulsion gave a result not appreciably different from the control. It was not found possible to render animals resistant to subsequent typhoid infection by injections of lecithin, but the substance was used to advantage in extracting the endotoxins for the purpose of making an immunizing serum. Cultures of the bacilli were flooded with lecithin emulsion, placed in the agitator, treated with chloroform, and the aqueous layer pipetted off. Guinea-pigs treated with this toxin were not affected by infection twenty-four hours later, with several times the fatal dose of typhoid bacilli.

MAGNESIUM SULPHATE.

Magnesium Sulphate as an Analgesic. S. Solis-Cohen[9] declares that he has noticed that the external applications of magnesium sulphate solution relieved certain deep-seated pains of arthritis, cutaneous inflammation, etc., although he would not say in consequence of, but sequent to the application. In order to test whether or not this was a psychic phenomenon, other applications were made—simple saline solution, distilled water, magnesium chlorid, sodium sulphate, etc. While any moist dressing alleviated the pain somewhat, none of them had the decided effect of magnesium sulphate. To determine whether or not any local anesthesia was produced, the tactile sense, pain sense and thermal sense were tested in normal persons, in the patients relieved by magnesium sulphate, and in the patients not relieved by it. In no instance was any effect of any kind on the cutaneous sen-

(9) Jour. Am. Med. Assoc., Dec. 4, 1909.

sations detected, whether the examinations were made within ten minutes or after from thirty minutes to an hour. He presents this merely as a curiosity of observation, but thinks it may be useful at times when one does not care to give morphin for deep-seated pains. The problem is complicated, and the method of observation is inexact, so that he cannot say that there really was a positive action of magnesium sulphate in these cases. He deems the matter, however, worthy of further observation.

Magnesium Sulphate in the Treatment of Tetanus. William Hessert, in Merck's Archives, enunciates the following indications to be met in cases of developed tetanus:

1. Remove the source of further toxin supply by proper local wound treatment.

2. Neutralize the toxin which may be contained in the tissue juices by massive injections of antitoxin subcutaneously.

3. Employ some remedy to allay the reflex excitability of the spinal cord; for example, subarachnoid injections of magnesium sulphate.

4. Nourish and support the patient.

Local wound treatment, aside from general well-understood measures such as drainage, wide incisions, and admission of air, removal of foreign bodies, etc., should include the use of balsam of Peru, which has been shown to have a favorable influence in neutralizing the tetanic process. Peroxid of hydrogen also is recommended.

Antitoxin, in spite of its great experimental efficiency in animals, and its undisputed value as a prophylactic, has proved so far to be extremely disappointing as a curative agent when the disease is fully developed. The reason for this can readily be appreciated when it is borne in mind that antitetanic serum, no matter how administered, can neutralize only that portion of toxin free and uncombined in the blood and lymph. It is immaterial whether it be given subcutaneously, intramuscularly, intracerebrally, intravenously, subdurally, or intraneurally, into the cord. The ultimate result is the same in all cases. The serum circulates in the blood, neutralizes such toxin as may be contained there, and the surplus is excreted. None of it reaches the nerve cell where the

toxin is locked up. Therefore, if there is already a fatal dose of toxin in the nervous system when the case is first seen, no treatment will be of any avail.

Statistics have shown, first, that the mortality from tetanus has not been lowered by serum treatment; and, secondly, that no special form of serum injection offers any advantages over the subcutaneous method. These various methods are always futile, and sometimes positively dangerous (intracranial injections).

As tetanus patients die either of exhaustion due to long-continued tonic and clonic spasms, or from asphyxia and heart-failure, treatment should be directed toward ameliorating or preventing such occurrences. Some remedy, which, acting on the spinal cord, will block the vicious reflex which produces the spasms, will fill the indications. This was accomplished first in 1904 by Murphy, who injected eucain-morphin by lumbar puncture; and Melzer, who in 1905 first published his results with magnesium sulphate. Intraspinal injections of magnesium sulphate in doses which do not affect the respiratory or heart centers, are capable of abolishing completely all clonic convulsions and tonic contractions in cases of human tetanus and experimental tetanus in monkeys. The relaxing effects of the injection may last twenty-four hours or longer. For therapeutic purposes, the intraspinal injections are better than the subcutaneous, as the latter are accompanied by too much depression of the higher centres of the cerebrum and medulla. The same intraspinal dose will produce in some individuals a more marked effect than in others. Women and children are more susceptible than men, and require smaller doses in proportion to their weight. As to the dosage: 1 cc. of a sterile 25 per cent. solution of magnesium is injected by lumbar puncture for every twenty pounds of body-weight in men. For women and children, the proportion is 1 cc. solution for every twenty-five to thirty-five pounds of body-weight.

The initial dose should be rather smaller than the average, in order to ascertain the susceptibility of the individual. An overdose will paralyze the heart or respiratory centers in the medulla. To avoid this effect on the medulla, it is always well to have the patient in a sitting position following the injection.

Fifteen to thirty minutes after the injection, the patient begins to experience relaxing effects. The spasms cease, and the muscles become flaccid. Pains are relieved, and opisthotonos disappears. The board-like abdomen and spastic chest relax. Reflex excitability is abolished. Food is taken and sleep is possible and refreshing. After twenty-four to thirty-six hours, the effect of the injection wears off, and the spasms reappear. The lumbar injection can then be repeated; and there is no limit as to the number, provided the dosage is proper and the drug well borne.

Miller[1] reports a case of tetanus successfully treated by 2.5 cc. injections of a 25 per cent. solution of magnesium sulphate into the meninges, 11 punctures being made in thirteen days. Extensive paralysis followed each injection and involved all the muscles except those of the head, neck and diaphragm, and lasted approximately from 18 to 29 hours. The injections were followed several times by respiratory collapse, lasting from 11 to 14 hours, and the pulse dropped, though not to a dangerous level. Antitoxin was used daily for 14 days, with copious saline enemas and sedatives for a short time. The case was one of severe tetanus in a boy 8 years old. There can be no doubt as to the value of treatment in this case.

A patient in violent spasm and continuous opisthotonos was repeatedly reduced to complete and lasting relaxation in the course of a few minutes by an intraspinal injection of magnesium sulphate; a result was thus achieved surely, promptly and safely, which can be but weakly approximated by the usual sedatives, and even then only after hours instead of minutes. The chief danger in the use of intraspinal injections of magnesium sulphate lies in its direct depressing influence on the respiratory center; this effect was produced repeatedly. No constant effect of the injection of the magnesium on temperature was shown. Retention of urine was the rule, and it was necessary to catheterize a patient for nine days.

MANUAL THERAPY.

Thompson[2] finds that manual therapy, at one time or

(1) Am. Jour. Med. Sciences, December, 1909.
(2) Boston Med. and Surg. Jour., Apr. 7, 1910.

another, has been used on every organ of the body and for nearly every disease, and that in many cases the beneficial results obtained far exceed those of any other form of treatment. In sprains, bruises and fractures, manual treatment has proved its value, relieving the dull, aching pain which usually accompanies these injuries. The cessation from pain is most marked, giving many hours of comfort which cannot be obtained in any other way.

Acute multiple arthritis is a disease which lends itself most readily to massage, in spite of what other writers may say in regard to forcing or driving the disease to other joints. Careful manipulation of the most swollen and tender joint, beginning above the joint, should very soon relieve the pain, lessen the swelling, and allow the limb to be moved. This method can easily be demonstrated by taking the knee and ankle of one leg for treatment, while the other, similarly affected, is treated by the usual orthodox remedies. Here the value of massage is seen from the first application.

Gonorrheal arthritis in the same way can obtain great benefit from massage if the effusion is non-purulent, and the joints to be operated on are chosen carefully. Myalgia and lumbago should always receive massage from the first, and very often will need no other form of treatment. The myositic deposits so often found in these cases can be removed promptly by massage, relieving in a few treatments pain that may have existed for months or years.

The pain in neuritis, sciatica, and in many of the neuralgias, can at times receive great benefit from massage; but cases will be found that tax the ingenuity of the operator. In these, some defect is usually to be found in the muscular or vascular system, together with some limitation of joint or functional movement, which will be the guide as to the means to be employed.

It is impossible to describe the many different methods used to obtain results, as the manipulations vary in each case and require to be altered and adapted according to the position and kind of pain, and to the functional disability incurred. The chief work falls on the thumb and finger-tips, the palmar surface of the fingers, and the thenar and hypothenar eminences. The movements—always concentric—vary from the lightest effleurage to the most

thorough pétrissage and tapotement, followed frequently by active, passive, assistive, and resistive movements, or various combinations. All these manipulations should never cause any pain in their application, but should be followed by relief of pain or tension, and a general feeling of lightness and well-being. On the other hand, too rough or violent manipulation will defeat the object in view, and cause increased pain, bruising, and general aggravation of existing symptoms.

The physiologic facts evolved from massage are increased elimination, vascularity and metabolism; absorption of infiltrations and exudations; improved nutrition; relief of congestion; and sedative effect on the nervous system. In addition to these, adhesions are attenuated, stretched and sometimes broken down.

In conclusion, Thompson states that manual therapy should be used much more extensively; that it opens up a wide field of investigation not only for the relief of pain, but also for shortening the time required for treatment; also as a means of increasing our knowledge of palpation, examination, and investigation, and of giving relief in cases in which we may hitherto have failed.

MENTHOL.

Steppe[3] used menthol in tuberculosis, internally at first, but with disappointing results. Since then he has applied it in the form of inunctions, and reports good results. He uses a 30 or 40 per cent. menthol salve. Some of the salve is rubbed into the skin for ten minutes until it is entirely taken up, a different part of the body being anointed each time. He has never observed any inconveniences from the method, but found benefit follow in the 14 cases in which he has applied this method of treatment perseveringly for four or five months. He gives the details of the cases. Improvement is evident, he asserts, after two or three weeks, and the patients continue to progress until they are practically cured, except in the more advanced cases, and improvement is evident in every case.

Acute tuberculosis either of lungs, glands, or bones, is not amenable to this treatment, but it is effectual in the

(3) Fortschr. der Med., Feb. 10, 1910.

infiltrations left after acute pneumonia in children. These relics of the pneumonia are generally tuberculous processes, and they yielded rapidly and completely to the menthol treatment in his 18 cases of this kind. He explains the action of the menthol as due to its elimination by the lungs after it has been taken up by the lymphatics. This enables it to act directly on the tuberculous tissue in the lungs. As this is absorbed, the walls of the cavity may sink in, and the cavity thus become obliterated. It is possible that a kind of auto-immunization may follow.

MERCURY.

Metallic Mercury.

Metallic Mercury in Intestinal Obstruction. The method of treating intestinal obstruction with large amounts of metallic mercury—half a pound to three pounds at a dose—is a very old one. It is now obsolete, and the physician who would try this method would probably be looked at askance. Yet this method was successful in probably a large majority of cases; and very recently J. McKean Harrison, reported two cases of acute intestinal obstruction relieved by mercury. The first patient was a man of sixty. His bowels had not moved for nine days, the abdomen was distended greatly, and there was vomiting and hiccough. His friends refused an operation, though the condition was most serious. Half a pound of mercury was administered. The next morning the patient felt easier, and was able to retain liquid nourishment. On the following day his bowels moved, and he felt much better. On the seventh day after the administration of the mercury, the patient was able to leave bed; and the mercury came away on the tenth day.

The second patient was a man of eighty, who was taken ill suddenly with great pain in the epigastric region. Aperients, belladonna, etc., failed to produce the desired effect, and the patient was getting worse. Finally, when the condition seemed hopeless, the patient apparently sinking, half a pound of mercury was administered, together with a grain of opium every four hours. Several hours after the administration of the metal the patient's bowels

moved, and he passed a good deal of flatus. He soon became distinctly better, his mind was clearer, and he was able to keep down nourishment. He made a satisfactory recovery. The mercury came away twelve days after the administration.

As is seen, there is something in the method, after all. In neither of the cases, was there the slightest symptom of mercurialism, nor did the mercury produce any increase in the abdominal pain.

Mercury in Syphilis.

Methods of Administering Mercury. Hay[4] compares the three methods of administering mercury—the internal, inunction, and injection methods. He concludes that all methods should be combined at different periods during a full course of treatment. A course of treatment in the early inception of syphilis should start either with inunctions or injections, and be followed by internal medication, instead of the pill or internal treatment being given first, and followed later by injections and rubs, as advised by most modern text-books. The brilliant results to be obtained in the prevention of future accidents in any case are to be accomplished in the first year's treatment, and we should attack the disease energetically when the system is being flooded with the syphilitic virus. The more rapidly we can overwhelm and cause the extinction of the spirochetæ with a treatment that is not injurious to the system, the better is our selection. Hence he has formulated the following routine to be pursued in cases of syphilis as they ordinarily run:

First year: Two courses of either inunctions or injections should be given covering a period of two months each. After each course of treatment, a month's rest should be allowed, and then internal medication should follow for two months during the interim up to within a month before resuming the second course, whether inunctions or injections, making four months' rubs, four months' internal treatment, and four months' rest.

Second year: Two courses of rubs or injections should be given, of six weeks each; two courses of internal treatment, of eight weeks each; two courses of rest, of six

(4) Jour. Am. Med. Assoc., Aug. 28, 1909

weeks each, and two of four weeks each—making a total of three months' heavy rubs or injections, four months' pills, and five months' rest.

Third year: Treatment every other month, alternating between the internal and more intense methods.

Fourth year: Six weeks of inunctions or injections.

Fifth year: Four to six weeks of inunctions or injections.

When first instituting treatment after infection, either inunctions or injections should be employed, followed by internal medication, instead of treatment with pills, first followed by more heroic methods, as advised by most of the leading writers. The inunctions, on an average, are superior to the soluble injections, and more lasting in their effects. The insoluble salts are too intense and profound to be employed in routine, and should be held in reserve for rebellious cases and for cases in which rapid and pronounced mercurialization is desired. Finally, the long course of treatment should be pursued in all cases.

The six cardinal points in the therapeutics of syphilis are to keep a close observation of the weight, kidneys, bowels, stomach, gums, and nervous system, especially the latter, as some patients never manifest any evidence of mercury in the form of stomatitis, the first evidence being a profound and acute nervous prostration.

The Inunction Method. Hecht[5] states that if for the sake of completeness in his paper, he refers to a positive prophylaxis against syphilis of the nervous system, he must of necessity mean the accomplishment of an ideal prophylaxis against the primary sore, with the aid, in one form or another, of an antisyphilitic vaccine. Whereas this seems far from realization, yet the experiments of Metchnikoff and Roux are indicative of a scientific bent in that direction. Mention of their work seems in place here also, because of the calomel ointment (calomel, one part, lanolin, three parts), which they advocate as a lubricant prophylactic to be applied to the genitalia immediately or within an hour after suspicious intercourse. The authors (Metchnikoff and Roux) remark that in their experiments this remedy has afforded immunity against primary infection, and accordingly it has been issued to the army by

(5) Med. Record, June 12, 1909.

the Secretary of War in France as a prophylactic measure against venereal disease.

The initial lesion once acquired, nothing short of a prompt, efficient, and sufficiently long-continued course of mercury and iodids is indicated. When well accomplished, such a course of specific treatment in the majority of cases will be of avail in preventing the dire tertiary consequences to the nervous system. This, Hecht thinks, none may doubt, since it has been estimated from very large and convincing statistics, that when properly treated perhaps 90 per cent. of the cases get well and remain so. A retrospect of the cases which the neurologist is privileged to see forces the conclusion, however, that the cases have been treated either imperfectly, improperly, or not at all.

Hecht then asks the question, "What constitutes, from the neurologic view-point, the best treatment in these cases?"

Extremely urgent instances aside, Hecht thinks it is the concensus of opinion amongst neurologists, that the inunction method has given on the whole the best satisfaction in nerve syphilis. It may be inferior to the oral, hypodermic, or intravenous method in point of rapidity and cleanliness; but it fulfils most of the demands made on it in most of the cases, is simple of application, is less prone to produce salivation, and obviates gastro-intestinal distress. He believes that to have the unguentum hydrargyri dispensed in an exact dosage in wax papers, with written instructions to the patient for its use, contributes greatly toward the efficiency of the method. It has been his custom to prescribe unguentum hydrargyri, ʒss to ʒj, to be rubbed nightly by the patients themselves when they are able; and the specifications call for one thorough rubbing on a different, non-hairy, flexor surface each night for five nights, this to be followed by a warm, cleansing bath on the sixth, a rest on the seventh, and then a fresh series of five rubbings on successive nights, with interruptions of bath and rest as before. The number of such series required is variable, four having sufficed in some of the author's cases, and eight in others. In private practice he has found most of the patients very ill at ease over the denial of daily baths; and, after making concessions,

has come to the belief that a short cleansing bath in the morning is no serious infraction upon the technic. In two of the considerable number of cases in his records he met with non-absorbing skins, which no amount of rubbing could affect; and, after a brief trial, resort was had to deep injections.

What Hecht has said of the official unguentum hydrargyri applies to the vaselin preparations containing from 25 to 33 per cent. of mercury. Occasionally one meets with circumstances where it is desirable to suppress the real facts surrounding a case of lues, as in the congenital types of the disease; and here antispecifics in agreeable disguise may be given in the form of colloid calomel, used as calomelol salve or unguentum Heyden, which contains an additional 2 per cent. of free mercury (Abt).

When absorption from skin surfaces has proven slow, Hecht suggests that the site of inunction be previously prepared by cleansing with soap and warm water, then alcohol or ether, and that this toilet be then completed by the application of a tight flannel bandage over the part rubbed.

With these qualifications, the endermic administration of mercury has given the author most gratifying results. The symptoms of brain syphilis will appear less ominous, he thinks, if we appreciate that mercury in large doses constitutes the remedy *par excellence*. It is mercury that annihilates the *Spirocheta pallida;* and if, as has been demonstrated, this protozoan may reside in the cerebral vessel-walls of the syphilitic, then it is the mercurials that are cardinally indicated, and iodids become but the essential adjuncts of the therapeutic scheme. So much depends on the pathology in each case, that generalizations as to the degree of recovery are quite difficult to formulate. The area of softening in the brain resulting from the complete occlusion of a cerebral terminal artery is not likely to be irrigated back to life; nor will the brain cells compressed in a patch of scar tissue, reminiscent of a destructive gumma, derive sustenance and potentiality from all the mercury and iodids that can be safely borne.

Small wonder, then, that our disappointments are not few. The lesson to be learned from this class of cases is that treatment should not only be adequate, but timely.

There are types of brain syphilis which carry a patient to dissolution in spite of the most ideal therapeutic premises; but happily they are rare. In cerebral lesions the results of treatment are sometimes marvelous, but more or less complete failures are more numerous than cures. In spinal syphilis the proportion of failures is far greater than the successes.

When it seems necessary to get quick and complete control of a syphilitic lesion—initiated, for instance, by single convulsive (epileptiform) seizure—the inunction treatment may well be waived in behalf of the more rapid administration of mercury by the deep intramuscular injection. The author has no hesitation in stating a preference for this method at critical periods in the disease. When it is intended to establish reservoirs of mercury in the deep muscular tissues from which slow absorption takes place, the insoluble preparations, such as calomel and the salicylate of mercury suspended in sterile oil or lanolin, are used. It is maintained by Gottheil, who is the most ardent advocate of insoluble mercurials in this country, that they are free from danger, painless, and of greater convenience to the patient because of longer periods intervening between injections.

The controversy that has been waged in dermatologic circles concerning the advantages or disadvantages of the soluble versus the insoluble mercurials need not receive extended mention here; but the author has found that the injection of insoluble mercurials in several cases caused quite as much pain as is experienced with the soluble corrosive sublimate. The dangers arising from the depots of mercury located in the deep tissues seem to him to be very real ones; and for this reason, he asserts, he has been content to use exclusively hypodermics of corrosive sublimate in doses varying from one-twelfth to one-fourth of a grain injected every second or third day. Soreness in the gluteal muscle masses is quite sure to follow; but, at its worst, it is transitory. The danger of thrombosis or embolism by penetrating a vessel is not great in these regions; but the remote possibility of so serious an accident should lead to great precaution in the technic, which, it is needless to add, includes rigid asepsis.

The Aachen (Aix-la-Chapelle) Method of Administra-

tion. Hayes[6] describes the Aachen treatment of syphilis as follows:

A thorough and exhaustive physical examination is made before treatment is begun. The heart, lungs, kidneys, nervous system, and teeth, each in turn, are considered carefully. The morning is commenced with a drink of from one to three glasses of the sulphur water. Next comes the bath, temperature and length of immersion being carefully adapted to the patient and to the type of disease. This is succeeded by a rest and breakfast in bed, to be followed soon after by application at the hand of an expert rubber of a 33⅓ per cent. mercurial ointment for twenty to forty minutes, the quantity and site of inunction varying according to circumstances. The thighs, calves, arms, and back usually are treated consecutively from day to day. The groins and axillæ are avoided. Stress is laid on mouth hygiene. A soft tooth-brush is used after meals, and a mouth-wash frequently during the day. These precautions permit mercury to be administered, if necessary, even to the point of causing a condition of general lassitude and drowsiness, or intestinal cramps. without the occurrence, save very rarely, of salivation or gingivitis. The extreme potency of the inunction as compared with internal administration, has been illustrated in his experience by cases in which the presence of a stump of a tooth, or neglect of the mouth toilet for even a day or two, have caused the rapid appearance of gingivitis during its application in patients who previously had taken courses of mercury by mouth for months together without buccal discomfort. Articles of diet calculated to produce looseness of the bowels such as white wine, uncooked fruit and vegetables, are forbidden. Early hours are advised and moderate use of or complete abstinence from tobacco, especially when the mouth or throat is affected. Plenty of fresh air and exercise short of fatigue, are found also to contribute in no small degree to the attainment of a good result.

The length of treatment for an ordinary case of syphilis during the first two years has hitherto been about six months, taken in courses of from four to six weeks with intervals of rest. During part of this time, some prepara-

(6) Brit. Med. Jour., Sept. 11, 1909.

tion of iodin or a tonic may be prescribed with advantage. Many authorities moreover, as the result of clinical work, regard with favor a further short course yearly for three or four years. Toward a decision in this matter, again, valuable assistance can now be obtained by an appeal to the serum test.

The author is absolutely in favor of the inunction method. In speaking of the objections urged against inunction, he remarks that stomatitis usually is associated with neglect of orders. Inunction has been stigmatized as dirty but we have the testimony of patients that inconvenience in this respect is usually quite trivial. Its success is dependent upon skill in rubbing, and upon proper supervision. It cannot be applied if there is much scarring or thickening of the skin, as after variola, or in ichthyosis. Certain eruptions, or very tender skins, preclude its use, as does a marked intolerance of mercury. It involves, of course, the devotion of some time daily to treatment. Diarrhea, dermatitis, lassitude, muscular fatigue, and pain in the limbs, are indeed consequences with which one may have to reckon. As to inequality of action, that may not improbably be due to the idiosyncrasy of the patient, or to the varying capability of the rubber. The advantages of inunction, on the other hand, include safety, potency, and painlessness, as well as freedom from most of the objections mentioned in connection with injections or internal administration. As it does not interfere with the digestive system, it permits of the simultaneous use, if necessary, of drugs by the mouth, and of subcutaneous or intramuscular medication. In theory, the utility of the intensive treatment by inunction has long been more or less recognized; but we are now in a position to avail ourselves to the full of its advantages, thanks to the results of the Wassermann reaction. By this means we can ascertain at any moment, in a large percentage of cases, the degree of the drug's effect on the poison.

Intramuscular Injections of Mercury. After having given or been officially responsible for something over five thousand injections in three years and a half, V. C. Pederson[7] is convinced of the following facts and advantages of this method of treating syphilis.

(7) N. Y. State Jour. of Med., March, 1909.

The injection method of treating syphilis is the most efficient of all methods. It keeps the patient best under control of the physician, because he must return once or twice a week for his injections and for other treatment as needed, perhaps being called for by new symptoms. Although the medicine used is an antiseptic, the injection is a surgical procedure, and as such requires the usual precautions of sterilization of the skin and of all instruments used. Rigid asepsis must never be neglected. If the injections are slowly and gently given with a long needle, and if the patient is in the proper position of relaxed glutei, they are in most cases virtually painless. If painful, the patient may be told that they are exactly like a bruise and of no more importance. In the bruise the extravasated blood is the foreign body, while in the injection the medicine is the foreign body causing the slight pain, by separation of the muscle fibers.

Node-formation of longer duration than two or three days is very rare if the injection is gently and deeply made into the muscle. Abscess-formation may be totally avoided if sterilized fluid, needle and skin are obtained. Embolism is a real danger, but is in fact very uncommon, occurring in the writer's experience, a little less than once in a thousand injections. Toxic accumulation is hardly excusable if palpation of the point of the preceding injection is made at each visit, before giving the next injection.

The salicylate of mercury appears to be so ultimately satisfactory that no other salt need be considered. The terms soluble and insoluble salts, meaning, as they do, *laboratory solubility,* are unfortunate. The soluble salts, of which bichlorid is the type, give a very prompt and extreme reaction during the first twenty-four hours. The so-called insoluble salts, with the salicylate as the type, give a slower, surer and more prolonged action, apparently lasting five days.

Continuation of the injection, as far as the writer's experience is concerned, is necessary for the usual two or three years, with one to two months' rest each year. Of course the patient's strength must be maintained at the highest possible level; and in short the disease must be managed like other parasitic diseases of which tuberculosis

is a type. Fresh air, good food, judicious exercise, and hygienic habits are indicated.

If the foregoing simple principles of employing this method of treatment are studied and followed, the writer is convinced that a larger number of physicians will adopt it as in every way the best means of treating this disease.

The Preputial Method of Administration. Milian[8] calls attention to the fact that mercury has been given by the mouth with the result of disturbing the digestion; by hypodermic injections, which at times are extremely painful; by inunctions, which are incompatible with privacy, and are, moreover, dirty; by suppositories, which have not proven very efficacious; and by the nasal mucous membrane, calomel having been insufflated.

He proposes as a new method the utilization of the preputial sac, stating that thus the drug can be introduced without ostentation, and in quantities sufficient to be efficacious. Indeed, the success has been so great with mercury that he proposes that this hitherto little-used mucous membrane be employed for the introduction of many drugs which irritate the stomach. He employs unguentum hydrargyri 4.0 gms., mixed with sufficient cacao butter to make a small pastille, or the mixture may be moulded into elongated rolls. The foreskin is retracted, the pastille or roll is placed in the coronary sulcus, and the foreskin is brought forward again. The author states that in four hours the drug has disappeared completely, nor does any of it escape by melting, absorption being complete. He has tried this method on forty patients, nor has he ever seen the faintest irritation result. It is singularly efficacious for lesions of the penis. As for the inconveniences of the method, the author states that there are none, except that, as he naively remarks, it is not applicable either to women or men who have no prepuces.

Mercury in Tuberculosis.

Mercuric Succinimide in Tuberculosis. B. L. Wright[9] remarks on the resemblance between tuberculosis and syphilis in their pathologic histology, and suggests that the au-

(8) Jour. de Méd. et de Chir., Jan. 25, 1910.
(9) Jour. Am. Med. Assoc., Nov. 28, 1909.

thentic cases of syphilis in which Lustgarten and others found this bacillus were complicated with tuberculosis, and that the germs found were really tubercle bacilli. That these organisms disappeared under mercury was at that time a strong argument that they were the bacilli of syphilis. Now that we know the real organism of syphilis, it would seem probable that the disappearance of the Lustgarten bacillus under mercury occurs because this drug had an antituberculous as well as antisyphilitic action.

Wright's attention was first drawn to the action of mercury in tuberculosis while on duty in the U. S. Naval Hospital, Pensacola, in the spring of 1905. Mercury was employed in several cases with a mixed tuberculous and specific infection with remarkable results, the tubercle bacilli disappearing and the lungs showing marked improvement on physical examination. This suggested an antituberculous action of mercury which seemed to him on reflection to be reasonable, and since assignment to the hospital at New Fort Lyon, Colo., he has resumed experimenting with this medication, now giving mercury by deep muscular injections to avoid the gastro-intestinal symptoms which were an annoyance when it was exhibited by the mouth. Since its use the death-rate has been reduced from 11.29 per cent. in the first quarter of 1908 to 4.76 per cent. in the second quarter, and 0.95 per cent. in the third quarter of the year ending September 30. Considering the fact that 60 per cent. of the patients were advanced cases, this result seems the more remarkable. Of the total number of patients under treatment 85.5 per cent. have been improved and there have been 2 cases counted as cures. Two officers, not included in the above have recovered so far as to return to duty and are holding their improvement. Of the remaining 13.5 per cent, 2 patients have held their own, 6 have failed and 1 has died. The contrast between the patients who refused the mercury treatment and those who received it, all under the same conditions otherwise, was very marked, only 33 per cent. of those refusing having improved and this chiefly in general condition rather than in the pulmonary lesions.

Wright believes that mercury acts as a tonic and as a bactericide in the blood. His method is to give an inject

tion of 1/5 grain of hydrargyrum succinimidum every other day until thirty injections have been given. Then the patient is placed for two weeks on iodid of potash, followed by a week without medication. Subsequently the mercury is resumed with slightly reduced doses for another thirty days, and so on. The drug should never be pushed to the point of salivation; and the doses given above are not absolute, but must be determined by close observation of each individual patient.

Method of Administering Mercuric Succinimide. H. Freeman[1] reports 4 cases of tuberculosis treated by injection of the mercuric succinimide. In each case there was an improvement in the general condition, evidenced by increased weight, normalizing of temperature, diminution of cough, expectoration, and night-sweats. Each individual case must be closely observed. If the patient is unable to take the full treatment, it is best not to begin. To get the full benefit of this treatment, one must have complete control of the patient. If the patient has a rise of temperature, he should be placed in bed and treated at home until the temperature becomes normal, when he may come to the office for treatment. The buttocks constitute the area for injections, alternating from the right side to the left side. The skin of the area is washed with sterilized hot water, or with a piece of absorbent cotton saturated with ether or alcohol. Syringe and needle are boiled prior to the injections. When the tablet is placed in the barrel, the needle is adjusted, ten minims of boiled water are drawn into the barrel, which is shaken to dissolve the tablet when it is ready for use. The needle should be from one inch to an inch and a half in length, and should be driven deeply into the muscular tissue by a downward plunge, and then the drug slowly injected. If slight hemorrhage takes place by accidentally puncturing a small vessel, no harm arises. Injections should be given every other day, beginning with 0.1 gram, and gradually increasing the dose until slight tenderness of the gums or diarrhea is produced; then the dose should be reduced until these symptoms subside, and continued until thirty injections have been given. After the first series follows a rest of two weeks; then treatment should be resumed and con-

(1) N. Y. Med. Jour., Dec. 18, 1909.

tinued as before, or as long as improvement continues. The initial dose of the remedy is about one-fifth of a grain. Indications for reducing the dose are symptoms of approaching mercurialization, sudden rise of temperature, loss of weight, gastric disturbances, excessive cough and expectoration coming on suddenly, especially when these symptoms have previously been under control.

Results of Wright's Treatment of Tuberculosis by Mercuric Succinimide. Squire and Kilpatrick[2] have treated 14 patients afflicted with tuberculosis by Wright's method, but 1 case had to be abandoned. Of the 13 patients who were treated, some for various reasons—wishing to return to work, domestic trouble, having to undergo a surgical operation—were not able to remain in the hospital as long as one could have wished, in order to give the method a fair trial. The buttock was chosen as the most convenient place for injection, and every precaution was taken to sterilize both the needle and the part injected. For each injection, 1/5th of a grain of mercuric succinimide was dissolved in ten minims of distilled water and injected into an alternate buttock every second day, Sunday being excluded. In the case of females no injection was given during the menstrual period. In all cases careful attention was paid to the teeth, and a mouth-wash was used after each meal.

While none of the patients objected to the treatment, it cannot be said that any of them liked it. With few exceptions, there was always a brawny lump, varying from the size of the tip of one's little finger to the size of one's thumb or a little larger, at the seat of the injection for about 48 hours. On one occasion, a lump arose in about half an hour almost the size of one's fist. The same evening it was about half that size, and the next morning it had almost disappeared. All the patients complained of a slight burning or pricking pain at the seat of injection for a time, varying from six to twelve hours. This was more noticeable when the injections were commenced, and later the patients complained less of it. Three of the patients felt faint after the injection on three or four occasions, and one of them had a slight vomiting attack immediately after. The female patients complained less of the pain

(2) Lancet, July 17, 1909.

than the males. This may be explained by the fact that nature provides them with more adipose tissue in that region, and therefore sitting down causes less discomfort.

The patients treated—6 females, and 7 males—varied in age from fifteen to fifty-one years; and all, with one exception, were more or less advanced cases, 3 patients having cavities, and all having tubercle bacilli in the sputum.

A remarkable fact, applicable to most of the cases, was the rapidity with which physical signs decreased. This continued for the first four or five weeks. Then, with 2 exceptions, most of the patients arrived at a stage where no further change could be made out, and some of them even returned to their former condition. In 2 cases, the physical signs disappeared altogether.

MOUTH-WASHES.

Mummery[3] states, that although very many antiseptics are used for purposes of mouth sterilization, a large number of these are rendered of little value owing to the fact that, if used in sufficient strength to sterilize the mouth within a reasonable time, they are either too caustic, as carbolic acid, or too poisonous, as perchlorid of mercury. The scientific composition of mouth-washes hence becomes of the utmost importance.

The following table of the relative values of the different antiseptics is taken from Professor W. D. Miller's book, *Micro-Organisms of the Human Mouth,* and is the result of careful and elaborate experiments extending over several years. The degree of concentration given in the table is one which can be used with safety and comfort in the mouth. The time necessary for devitalization refers to the time taken by each antiseptic, in the degree of concentration given, to devitalize completely a growth of a ferment bacterium from the mouth grown in pure culture in the laboratory.

(3) Practitioner, May, 1909.

Antiseptic.	Concentration.	Time necessary for devitalization.
Salicylic acid	1/200	Half a minute.
Benzoic acid	1/200	One to two minutes.
Borobenzoic acid	1/175	One to two minutes.
Thymol	1/1,500	Two to four minutes.
Bichlorid of mercury	1/5,000	Two to five minutes.
Carbolic acid	1/100	Ten to fifteen minutes.
Oil of peppermint	In agreeable strength	Five to ten minutes.
Permanganate of potash	1/4,000	More than 15 minutes.
Boric acid	1/50	More than 15 minutes.

The comparative uselessness of carbolic acid as an oral germicide is evident from this table, since no one will consent to hold a wash in the mouth for ten or fifteen minutes at a time; yet probably carbolic acid is prescribed oftener as a mouth-wash than any other antiseptic. On the other hand, the value of salicylic and benzoic acids is clearly brought out, the preference being given to the latter in spite of its slightly less powerful germicidal qualities, owing to the more beneficent action which it exercises on the mucous tissues. To quote the words of Professor Miller:

"As a mouth-wash, we need above all a solution which acts quickly and which does not simply prevent the development of micro-organisms while it is acting, but which devitalizes them. There are agents which even in very dilute form, if applied constantly, have a powerful antiseptic action, inasmuch as they prevent the development of such micro-organisms as may be present without devitalizing them. Such agents are of no more value in the treatment of the oral cavity than an equal amount of distilled water. It is seldom that any one, in rinsing his mouth, will retain the wash longer than a minute; and an antiseptic mouth-wash, to be efficient, should be able to devitalize the micro-organisms with which it comes in contact within this short time."

Professor Miller found that the following combination of agents given in the above table accomplishes this for all, or nearly all, micro-organisms in the vegetative form. A solution which devitalizes spores in one minute is out of the question, and in fact is not at all necessary, since the conditions which lead to the formation of spores do not exist in the mouth where we almost exclusively find the vegetative forms.

℞
Saccharini, gr. x.
Acidi benzoici, gr. xiv.
Tincturæ krameriæ, fʒj.
Ol. menth. pip., min. ij.
Ol. cinnam., min. ij.
Alcohol absol., fʒj.

One part of this wash added to nine parts of water, held in the mouth for one minute, will sterilize the oral cavity effectively. The saccharin was found to add considerably to the value of the wash.

A simple form of the wash is as follows:

℞
Acidi benzoici, gr. xviij.
Tinct. eucalypti, fʒjss.
Alcohol absol., ʒx.
Ol. menth. pip., min. iv.
Sig. A teaspoonful to half a glass of water.

A very excellent mouth-wash for chronic septic gingivitis, such as occurs in pyorrhea alveolaris, can be composed with the addition of salicylic acid:

℞
Acidi salicylici,
Acidi benzoici, āā gr. xvj.
Tinct. krameriæ, fʒjss.
Alcohol absol., fʒj.
Sig. A teaspoonful to a small wineglassful of water as a mouth-wash.

The salicylic acid, besides being a powerful germicide, has a caustic action upon the gums; and this, together with the astringent effect of the rhatany, makes the wash a useful one for such cases.

As a local prophylactic measure against dental caries, bactericidal mouth-washes have also a large sphere of usefulness. When, however, deep retaining centers for food exist in and between the teeth, the complete sterilization of such places is not possible by means of mouth-washes alone. The food must first be removed by means of the tooth-brush, thus enabling the wash to flow into such positions, and effect their proper sterilization. Used in this way, in conjunction with the tooth-brush, antiseptic washes are of decided value as a preventive against dental caries.

MUSTARD PACKS.

A. A. Herzfeld[4] discusses the excellent properties of mustard as a counter-irritant in the treatment of capillary

(4) Jour. Am. Med. Assoc., Jan. 9, 1909.

bronchitis and bronchopneumonia in infants and children. He and his colleagues have been using a method devised by him for the past thirteen years with great advantage. His method is as follows: 250 cc. each of water and alcohol are mixed in a large bowl; to this are added from 25 to 50 cc., according to the severity of the case, of freshly prepared spirit of mustard. The spirit of mustard is prepared according to the formula in the German Pharmacopeia, as follows: Oil of mustard 1 part, pure alcohol 49 parts.

A large piece of flannel is moistened with the mixture and wrapped around the child from the neck to the knees. The child is then enveloped in a dry sheet, and the pack is left on until the skin is a bright red, usually in from fifteen to thirty minutes. The child is then taken out and wrapped, and left for another half hour in a pack wet with 1 part alcohol and 2 parts water. At the end of this time the child is wrapped in a dry sheet. Usually one pack causes marked improvement but relapses are frequent, and it may be necessary to repeat it. Once in twenty-four hours is enough unless the indications are unavoidable. The physician should apply the first pack himself, both to determine the strength needed, and to instruct the parents or nurse. Herzfeld sums up the advantages of the method as follows: 1. It is surprisingly rapid in effect. 2. Its light weight does not materially embarrass respiration. 3. It can be applied without removing the enfeebled patient from the bed. 4. It is inexpensive. 5. It is clean.

NITROGLYCERIN AND THE NITRITES.

The Pharmaco-Dynamics of Nitroglycerin. Dmitrenko[5] reports 23 cases in which he studied the pharmacodynamics of nitroglycerin. Its action was manifested in 16 of the cases by subsidence of the pressure in the brachial artery, while at the same time the pressure rose in the arteries of the fingers. This, with other facts observed, indicates that the drug has an elective action on the peripheral portion of the circulation. As it dilates the arterioles, the resistance they previously offered to the blood-

(5) Zeitschr. f. klin. Med., Aug. 28, 1909.

stream is reduced, and thus the work of the heart is lightened to that extent. If the heart is very weak and close to exhaustion, the blood-pressure of the finger arteries rises very little if at all. The organism responds to dilatation of the cutaneous vessels, with contraction of the visceral vessels, as the vasomotor innervation strives to maintain a uniform pressure throughout. The power of dilatation of the peripheral vessels determines the amount of action of the nitroglycerin. When the peripheral vessels have lost their elasticity, as under the influence of typhoid, tuberculous or diphtheria toxins, nitroglycerin is not only useless, but if the heart is weak, actually dangerous. Under favorable conditions, it reduces the pressure in the central portions of the circulation, and increases the pressure in the peripheral, the latter feeling the effect longer. The effect begins to wane in from three to thirty-five minutes, but the action of the drug is still perceptible in the finger arteries at the end of an hour. It is indicated only in the cases in which the pressure at the periphery rises, while the brachial pressure drops under its influence. This phenomenon is particularly evident when the patients feel worse after the administration of digitalis, which has whipped up the irritated, much-hypertrophied heart muscle without removing the obstacles in the periphery.

The Reduction of Blood-Pressure by Nitrites. Experiments by G. B. Wallace and A. S. Ringer[6] with amyl nitrite, nitroglycerin, sodium nitrite, and erythrol tetranitrite show that these substances all cause a uniform percentage fall of blood-pressure; the higher the blood-pressure the greater the fall. The effect is, within certain limits, directly proportionate to the size of the dose. While the effect of amyl nitrite inhalations is almost instantaneous, the action of nitroglycerin given by mouth, begins in about two minutes, so that nothing is gained by resorting to the hypodermic use of this drug. Headache following the administration of the nitrites seldom occurs when the blood-pressure is originally high. Even very sclerotic arteries respond readily to nitrites, and in patients with arterial hypertension the effect lasts much longer than is the case with normal individuals. Thus the duration of the action of erythrol tetranitrite in this series with hyper-

(6) N. Y. Med. Jour., June 12, 1909.

tension averaged three hours, the minimum being reached in one hour, while in normal individuals the action lasted for an hour only. The action of sodium nitrite lasts one hour in the normal man and two in men with high blood-pressure. The effect of nitrogylcerin seems to last about one-half hour in either case.

The writers have found the most effective method of exhibiting these drugs to be as follows:—amyl nitrite by inhalation, nitroglycerin in the official 1 per cent. solution, sodium nitrite in freshly made solution, and erythrol tetranitrite in chocolate tablets.

The Treatment of Hypertension. The experimental and clinical experience of H. Vaquez[7] with amyl and sodium nitrite, spirits of glyceryl trinitrate and other nitrous compounds teaches, he thinks, that in order to obtain the desired benefit from administration of the nitrites, they must be given before the system regulating the blood-pressure has had opportunity to adapt conditions to counteract the modifications induced by the drug. The action is more inconstant the later it is manifested, and it is inevitably transient. These drugs can tide the patient past some critical period, but they have no permanent influence on habitual hypertension. They should not be used systematically for this purpose, one argument being that they would lose their power when needed at a critical moment. Spirit of nitrous ether is the only one of the group to which the above does not apply. This drug is more of a general sedative for the circulatory system than a reducer of tension, and it does not contra-indicate the use of the other preparations at need.

The writer advocates it in doses of from two to four grams (thirty to sixty grains) a day, in divided doses, kept up for a long time. But when occasional prompt action is necessary, the organic nitrites must be called on, and he enumerates the reasons which have made him reject all but nitroglycerin. This he regards as the one remedy for angina pectoris and paroxysmal edematous dyspnea in persons with arterial hypertension. He has it put up in vials containing a single dose, five drops, of the official alcoholic solution, to be diluted with water and taken at the onset of the attack. Its prolonged use will neither prevent the

(7) Jour. Am. Med. Assoc., May 16, 1908.

paroxysms nor remove the cause. The writer believes that the toxicity of the drug has been much exaggerated. Some of his patients took up to forty drops a day without injury.

Nitroglycerin and Digitalis in Myocarditis. In the experience of S. B. Ward,[8] one-drop doses of 1 per cent. solution of nitroglycerin given with digitalis, every two or three hours, are practically inert; but if from one-twentieth to one-tenth of a grain be given every minute, for twenty or thirty doses, brilliant results will be obtained, days before the effect of digitalis can possibly be expected. In edema of the lungs, the toleration for this drug is most extraordinary, and relief from dyspnea is uniformly obtained before the physiologic effects, such as flushing of the face and throbbing headache, are produced. Two cases of myocarditis are reported with cardiac failure and edema of the lungs, one without and the other with a valvular lesion, in which nitroglycerin was of the greatest service.

Minns[1] reaches the following conclusions as to the value of nitroglycerin in preventing hemoptysis in tuberculosis:—

1. While there may be other elements in the production of hemoptysis, it is evident that blood-pressure in the pulmonary area plays an important part.

2. Estimation of the blood-pressure in the pulmonary area cannot ordinarily be made experimentally.

3. Clinical observation, however, goes to show that there is a relation between pulmonary pressure and systemic pressure.

4. Such preparations as nitroglycerin are capable of reducing blood-pressure in the circulatory system; and by their use it would seem to be possible to keep the pressure in the pulmonary area in any particular case reasonably below the danger point.

5. The drug should be administered in small doses, and may be continued over long periods.

6. The results reported here have been the result of the study of over six hundred cases of pulmonary tuberculosis in residence, and the treatment as carried out for nearly two years has given time to prove the efficiency of the same.

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(8) Albany Med. Annals, November, 1909.
(1) Canad. Practitioner, March, 1910.

7. It would seem to be indicated that this drug should be administered in the morning some time before the hour of rising, and subsequently, say, at 7:30 and 11:30 a. m., 4:30 and 7:30 p. m., in order to have the result produced before the blood-pressure is raised by the exertion incident to toilet, meals, etc.

8. When 1/100 grain of nitroglycerin will reduce the blood-pressure 15 mm. in less than ten minutes, the same dose, given four times a day for say two weeks, should be sufficient to maintain a lower pressure than the individual's normal.

9. While the administration of nitroglycerin has not proved to be an absolute preventive, still in the large majority of cases with a previous history of hemoptysis or the occurrence of the same, it has clearly been proved to be efficacious in reducing the frequency of the complication and in lessening the amount of blood lost when it does occur.

NITROUS OXIDE AND OXYGEN.

Nitrous Oxide and Oxygen Anesthesia. Pearis says[2] that nitrous oxide and oxygen is the safest of all anesthetics. Postoperative complications are less frequent. Its more general use should be encouraged. When pure nitrous oxide is administered, anesthesia is produced rapidly, and is accompanied by symptoms of asphyxia. The cyanosis which appears is of a very different character from that which sometimes occurs during the administration of ether and chloroform. In the latter case, cyanosis is the result of interference with the action of the heart. It is a condition which demands attention, and is the cause of alarm on the part of the anesthetist.

Cyanosis from nitrous oxide is an entirely different condition and is due to lack of oxygen in the blood. The condition is transient and readily disappears when air or oxygen is admitted. The cyanosis itself is not a dangerous condition, although it is not a pleasing sight. This appearance of a patient under nitrous oxide is probably one reason why nitrous oxide has not become popular with the medical profession. It is different with the dentists, and

(2) Jour. Am. Med. Assoc., Apr. 30, 1910.

cyanosis is not a cause of alarm from their standpoint. In fact, many dentists are accustomed to administer nitrous oxide until they obtain a marked degree of cyanosis. The mask is then cast aside, the tooth extracted, and after a few inspirations of air, the patient has regained his normal appearance. The dentist is accustomed to see this cyanosis. He knows that it is not a serious condition, and it does not worry him. With physicians it is different, and it is not an easy matter to overcome the prejudice which exists in their minds on account of this appearance of the patient. Should convulsive movements occur during the administration, it is a warning to stop the gas and admit air. Otherwise dangerous asphyxiation may arise. It is impossible to administer pure nitrous oxide continuously for any length of time without the admission of air. After a few inspirations of air, the cyanosis lessens, the patient moves, and he is soon awake unless more nitrous oxide is given. In prolonged administration of nitrous oxide and air, this process is repeated again and again. In reality, it is putting the patient to sleep, allowing him to recover partially, and then repeating the process. It requires the greatest skill to maintain anesthesia under such conditions, and it is at best not very satisfactory. By using oxygen instead of air, we can maintain better anesthesia, and the appearance of the patient is improved very much. The degree of cyanosis and the time required to produce anesthesia are in direct proportion to the amount of oxygen used.

OBESITY CURES.

Milk Diet.

Moritz[3] has been delighted with his experience with a milk diet as a means of influencing obesity. It is the simplest and most convenient technic, he says, as well as the cheapest, while it permits individualization and makes the least demands on the patient's attention. He has found it extremely effective, as he shows by 8 typical examples. The patients lost from sixteen to forty-six pounds in from fifteen to eighty-one days on the exclusive milk diet, while it had a favorable influence on complications on the part of the

(3) Muench. med. Wochenschr., Jan. 28, 1908.

heart and kidneys. The heart disturbances subsided, and the pulse tension and rate declined. He allows from three to five pints of milk a day, in five portions, approximately a pint at breakfast-time, a glass at 10 a. m., a pint at noon, another glass at 4 p. m., and a pint at 7 p. m. The milk is taken cold or warm as desired, and up to a pint of water may be added.

This technic obviates thirst and hunger, while the weight rapidly declines. Another advantage is the absence of salt from the diet. The only by-effect observed is a tendency to constipation which must be combated. Occasionally there is a little headache or backache, with depression, if the weight declines too rapidly. He gives the tabulated findings of the metabolism for three months in one case, remarking that the conditions of the milk diet are remarkably simple and instructive.

Potato Diet.

Rosenfeld[4] reports continued success with and advocates wider adoption of his method of treating obesity which he introduced four years ago. He here describes the bases for it and the mechanism of its action. The diet must be kept up for months or for a year or so, and on this account it must be palatable and satisfying. The main features are the supplying of the necessary amount of albumin, the prohibition of fat, the small number of calories, yet with plenty of carbohydrates, especially in the form of potato, and large amounts of cold water for the beverage, rest in bed and frequent meals.

The feeling of satiety depends on the filling of the stomach, and it seems to be immaterial to the stomach what it is filled with. The food must be such as to fill the stomach while supplying merely small amounts of nourishing substances. Potato, water and soups fulfill these requirements and aid in reducing the fat. Every quart of cold water (10° C., or 50° F.) ingested causes the consumption of 27 calories to bring it to body temperature, that is, equivalent to the consumption of 3 gm. of fat. As "filling" foods must be selected, fat should be avoided. Small, frequent meals prevent the development of a too hearty appetite, as also repose, especially bed rest.

(4) Archiv. f. Verdauungskr., June, 1909.

The diet, therefore, is, for the first meal: Tea with saccharin and 30 or 40 gm. of rolls with marmalade or the like; the second meal is 10 gm. of cheese and water; the third 100 gm. apple and water; at noon, two glasses of water, 1 or 2 plates of soup with potatoes and vegetables, lean meat and salad without oil. During the afternoon, tea with saccharin, 6 prunes and water; later, 100 gm. apple. For supper, 2 eggs and potato salad or lean meat and vegetables. The principal advantage of this diet is that the patients do not feel the restrictions and do not become irritable or nervous.

The only by-effect noted was occasional backache, which probably was due to the change in the attitude of the spine as the abdomen lost its fat. The patients thrive on this diet and feel better in every respect, as he shows by a number of examples. Caution is necessary with diabetes, and the amount of fluids ingested had better be kept below 2 liters if there is general dropsy. The reduction of weight on this diet is from the loss of actual fat. It often requires more than six months to bring the patient down to his normal weight, and it is wise to keep up this diet a few days in each week to maintain the benefit.

OPIUM.

Stimulating Effect of Opium. Smith[5] states that opium has stimulating as well as sedative properties, and that as a general stimulant to the nerves, the brain, and all the organs of life, its value, even for this quality alone, entitles it to a high place in the esteem of the practical physician. Opium and morphin are not quite the same in this respect. Of the two, it is in the former that the quality is most active. The stimulating effect is best brought out by the use of small doses given at convenient intervals, for in a full dose the sedative influence of the drug is so decided that any primary stimulating effect passes off too quickly to be noticeable.

This stimulating action is well seen in cases of indolent ulcers of the skin and mucous membrane. Such sores as had resisted previous treatment will be found to show a surprising improvement after only a few doses of the

(5) Brit. Med. Jour., Dec. 4, 1909.

remedy. The pale, unhealthy looking surface becomes red, and soon is covered with closely set granulations, while its secretion changes from a thin, serous fluid, to healthy looking pus. This invigorating influence can be turned to account in the case of obstinate sores occurring in cachectic children. The ulcerative stomatitis, which is so common among the ill-fed and badly nourished children of the very poor, often shows little disposition to heal, even when treatment is re-enforced by a generous diet and healthy surroundings. When repair is thus at a standstill, a few drops (two to five) of laudanum, given twice a day, quickly induce a welcome change in the local conditions, and start an improvement which goes on smoothly to a cure.

The nervous trepidation called "stage fright" may be forestalled and disarmed by a small dose, five or six drops, of laudanum taken half an hour or so before the trial is to begin. Again, the nervous trembling and depression which may be induced by shock, and which are apt to follow a surgical operation, are amenable to the same influence. The above dose, repeated, if necessary, several times, at intervals of half an hour, is usually followed by tranquillity and sleep. The same treatment will go far to relieve the distress of dying persons. Under the influence of a few drops of the tincture the painful uneasiness abates, and is succeeded by a period of restful calm which may be maintained by judicious repetitions of the remedy until the close. Again, the profound mental depression which sometimes afflicts elderly people, making their lives a burden to themselves and to their relatives, may be alleviated by the same means. In this as in the preceding cases, the drug acts as a stimulant, and something more. It quiets the nervous irritability, and gives a welcome spur to jaded nerves.

The Treatment of the Opium Habit. Rochester[6] describes the treatment of opium-smokers as carried on at San Juan de Dios Hospital, and later at the San Lazaro Hospital to which the patients were transferred. There were 200 patients, 197 Chinese, and 3 Filipinos. All were of the male sex. Their ages were from seventeen to sixty-three years, with an average of thirty-five years and a

(6) Jour. Am. Med. Assoc., Jan. 30, 1909.

third. The length of time in which they had been habitual users of the drug was from six months to thirty-three years, with an average of seven years and a half. This average, subtracted from the first average, shows that the average at which they became addicted to the habit was twenty-seven and five-sixths years. A very interesting fact which developed while ascertaining the most popular method of self-administration was the great number who were found to use the hypodermic syringe. Our usual mind-picture of the Chinese opium fiend is one in which he is reclining on a couch with his alcohol lamp and crude opium in front of him, his pipe in his mouth, and surrounded by the reeking smoke of the burning opium.

This picture, however, to a great extent has become a thing of the past. Although the Chinaman may have been slow in accepting most of the new ideas and inventions of the Occident, he has seen very quickly the true worth of the hypodermic syringe and its great advantages over the old opium-pipe. In it he has an instrument whose action is swift and sure. It was found that 29 per cent. of the patients at San Lazaro had used the drug in this manner. On close questioning, however, it developed that all but 2 or 3 had got their first taste of the effects of the juice of the poppy by the smoking method. The smallest number was those whose favorite method was the eating of the drug, the percentage of those who used it in this manner being only nineteen.

The patients were separated into three classes, each in a separate ward. Ward 1 was the receiving ward. A careful examination of the patient's physical condition was first made, a bath was given him, he was searched carefully for any concealed opium, and was questioned through an interpreter as to the amount of opium or morphin he had been accustomed to take, his method of administering it, and the length of time he had been using it. He was kept in this ward where he was always under close observation by trained male nurses as long as he was receiving opium or sedatives in any form, and as long as his physical condition demanded attention.

Ward 2 might be called the hospital ward, for it was here that all patients were sent on development of serious symptoms of intercurrent diseases. This ward was under

the care of graduate female nurses, and the patients here received close attention as to diet, nursing, etc.

Ward 3 may be classed as the convalescent ward. When a patient seemed to have returned to a normal state both physically and mentally, he was removed to this ward. No opiates of any kind were given here; and if a patient should develop symptoms calling for the administration of his favorite drug, he was returned to Ward 1 before the prescription was given. Briefly, Ward 3 was a sort of detention station in which the apparently cured patients were confined under observation awaiting dismissal. The only treatment given here was a 1 dram dose of the elixir of iron, quinin, and strychnin after meals.

The points of interest developed during the treatment of this series of cases of opium-smokers were:

1. The rapid withdrawal of opium from the habitual Chinese opium-smoker is attended with very little danger and a surprisingly small amount of suffering.

2. In a comparatively short time, his system regulates itself to carry out its functions without the aid of the narcotic.

3. The constipating effect of opium, when taken into the system by smoking, is not great; for its withdrawal after long use by this method is attended by very little diarrhea.

4. The deteriorating effects of long-continued opium smoking on the physique of the Asiatic is of no alarming importance. The results of the use of opium seem to be less injurious to the Asiatic than the continued use of alcohol when taken by the Caucasian. The patients who used morphin hypodermically, or opium by mouth, were by far harder to treat than the smokers, and their treatment presented no ideas other than those which have been reported in the past. They were reduced gradually in their daily dose, and treated symptomatically.

Only one matter of interest occurred during the treatment of these patients, and that was the results of experimenting with the hyoscin substitution treatment. Fifteen patients who used morphin hypodermically were picked out for the experiment, and at 7 o'clock one evening each was given ¼ grain of morphin and 1/100 grain of hyoscin. This first night the result seemed to be fairly

good. The second evening the procedure was repeated, but not so successfully. Some of the patients were very restless all night, others seemed to be dazed, and four were delirious. Despite these facts, however, the dose was repeated on the third night. Within fifteen minutes after the administration of the hyoscin, in half of the patients there developed a wild, talkative delirium. They were wandering about the ward, if not held in bed, absolutely oblivious to their surroundings, not recognizing their friends, or hearing or heeding what was said to them. Of the remaining patients, only 2 were entirely unaffected. In 2 there developed the most violent gastric symptoms, expressed by excruciating pains in the stomach and abdomen and most violent retching and vomiting. The breathing apparatus of one was so disarranged as to require artificial respiration. The rest suffered cardiac collapse, with pulse that could hardly be felt at the wrist.

OSMIC ACID.

Germain[7] remarks that in considering the subject of trifacial neuralgia, one is struck by the diverse conditions said to be the cause of the disease. These cases may be divided into three great classes:

1. Neuralgia as a symptom of some general disease; anemia, diabetes, etc., where there are usually definite nerve changes; neuritis.

2. Reflex intermittent pain due to some local cause, as a carious tooth, sinus disease, etc.

3. True epileptiform neuralgia, to which neither true cause nor favoring conditions can be assigned.

It is the latter condition which we are called upon to treat surgically sooner or later in its course. The chief features of this true major neuralgia are well summarized by Hutchinson:

1. It is almost invariably unilateral.

2. It commences in the second or third division of the fifth nerve, and tends to involve both.

3. The first division is involved to a much less degree.

4. Attacks of pain are paroxysmal or spasmodic, and

(7) Boston Med. and Surg. Jour., Feb. 4, 1909.

tend to increase in severity, with shortening intervals of freedom from pain.

5. During each attack, there is usually spasm of the facial muscle of the affected side.

6. The subjects of the disease are usually adults between the ages of thirty and fifty.

7. Its progress is one of increasing severity.

8. Medical treatment has little or no effect.

9. Operations on peripheral branches give temporary relief.

Partial or complete removal of the Gasserian ganglion usually cures. It has been a common experience that nerve stretching, nerve section, and evulsion of the whole nerve, according to the method of Thiersch, is followed by relief from pain for a longer or a shorter period of time. All of these procedures are followed by regeneration of the peripheral nerve and recurrence of pain. The period of relief varies from three months to two years, but is almost never permanent.

Of late years, certain injection methods have been in vogue, notably, osmic-acid injection and injections of alcohol. Germain has used a 2 per cent. solution of osmic acid injected directly into the nerve trunk in 11 cases. He believes that osmic-acid injections will relieve trifacial neuralgia for a longer or a shorter period of time. Relief from pain is not immediate, but follows in a few days after the injection. It may be followed by a certain amount of necrosis of tissue at the point of injection, and it is little, if any, better than other peripheral operations. It is best used in a 2 per cent. solution injected directly into the nerve, using a glass syringe and a platinum needle; and it should be used only in purely sensory nerves, as its employment in mixed nerves is followed by motor paralysis.

OXYGEN AND OZONE.

Effect of Oxygen and Ozone Upon the Growth and Toxicity of Pathogenic Bacteria. Burkhardt,[8] in a series of experiments on rabbits and dogs, tested the effect of chemically pure oxygen on wounds and infections.

(8) Med. Rev. of Reviews, Feb. 25, 1909.

In his studies of the inhibitory influence exerted by the oxygen on the growth and toxicity of pathogenic bacteria, the author examined in the first place the ordinary pus-producers, notably the *Staphylococcus pyogenes aureus.* His findings may be summarized as follows:

1. Contact with pure oxygen gives rise in wounds to a well-marked vascular injection, and there appears a state of arterial hyperemia. The wounds remain more moist, and the formation of granulation tissue is stimulated.

2. Cultures of facultative aërobic bacteria are retarded considerably in their development when grown in an atmosphere of pure concentrated oxygen, but they are not destroyed.

3. In the animal body even a supply of oxygen in great abundance applied to the infectious focus does not seem to inhibit the growth of the bacteria to a notable extent. Neither is this the case in general infections when the entire body of the laboratory animal is bathed in oxygen. The animal experiments, however, indicate that there occurs a certain slight diminution in the virulence of the bacterial poisons.

4. In the peritoneum, the contact with pure oxygen produces a state of mild inflammatory irritation. A rather considerable hyperleucocytosis develops, especially in the presence of fluids in the abdominal cavity. Absorption in the abdominal cavity is retarded.

5. Ozone seems to be adapted better than oxygen for the control of infections, especially in body cavities which are filled easily with the gas. It certainly appears promising to continue the experiments with ozone in septic infections.

Cavity of the Lung Successfully Treated with Ozone. G. Stokes[9] reports the case of a man who had pneumonia with pleurisy followed by empyema for which portions of ribs were resected in front and behind. The posterior wound healed satisfactorily but the anterior did not. The discharge became offensive and putrid and the patient became septic. He was treated with a vaccine on the Wright principle and in due time a small piece of lung tissue came away with a subsidence of the sepsis. There was left a lung cavity and sinus extending over six inches

(9) Lancet, Apr. 18, 1908.

from the chest wall and communicating with the bronchi. This cavity was treated with ozone gas injected under pressure, and after a course of treatment carried out on thirty different days extending over a period of seven weeks the patient was cured. The author says that the bacteriologic changes which took place confirm the following statements: (1) Micro-organisms which are benign and useful under healthy conditions will under unhealthy conditions become hostile; (2) that hostile micro-organisms require unwholesome matter for their nourishment: (3) that ozone and oxygen act by so changing and purifying the discharges that hostile micro-organisms, being deprived of the matter necessary for their existence, decrease and finally disappear; and (4) that oxygen and ozone have this effect on every micro-organism he has ever been able to discover in wounds or suppurating surfaces except the staphylococci, which under these conditions increase in number and often in size. These conclusions are the result of observation and macroscopic examination of the pus from 500 cases treated with oxygen and ozone. In the foregoing case, before commencing the treatment a specimen of pus was taken from the wound and a culture was made from it for microscopic examination. This was repeated at intervals during the treatment. The microphotographs taken of the slides that were prepared show a steady decrease and final disappearance of those microorganisms that are hostile to healing, and a steady increase of the staphylococci which under the influence of ozone and oxygen always increase in number and often in size as the healing process goes on.

Oxygen in Tuberculous Peritonitis. McGlinn[3] points out that three types of tuberculous peritonitis are recognized—the ascitic, the fibrous, and the ulcerative. He quotes various authorities to show that by the plans of treatment now in vogue the fibrous and ulcerative forms of tuberculous peritonitis are not amenable to treatment, and that at best only 75 per cent. of the ascitic forms can be cured. Since April, 1904, he has used oxygen in 15 cases, 4 of which were of the fibrous variety, with excellent results, notwithstanding that his reasoning he now considers

(3) N. Y. Med. Jour., Aug. 22, 1908.

faulty. He briefly reports the 4 cases, and describes the method as follows:

The water bottle of the oxygen apparatus is sterilized and filled with sterile water. The tube leading from the bottle and the rubber tip are sterilized. The tip is covered with several thicknesses of sterile gauze. The oxygen is introduced through the abdominal incision until the abdomen becomes inflated. Then the incision is closed with gauze, and the oxygen is allowed to remain for several minutes. Then the gas is allowed to escape, and the peritoneal cavity is filled again and again.

Oxygen in the Abdominal Cavity After Laparotomy. Bainbridge[4] has employed oxygen in a novel way, allowing it to fill the abdominal cavity after laparotomies, the tube carrying the oxygen being inserted into one corner of the wound. Experience with this method in 30 cases showed that oxygen administered in this fashion distinctly lessened postoperative shock, hemorrhage, nausea and vomiting; it overcame the dangerous negative pressure in the abdomen resulting from the removal of large tumors; and it prevented or diminished the tendency to the formation of adhesions. In a few cases of tuberculous peritonitis, it seemed to add to the curative action of simple laparotomy, and in septic peritonitis its use was followed by distinct improvement in the symptoms.

Bainbridge's method consists in ballooning the abdomen with the gas, and then closing the wound, thus allowing the tissues to absorb the oxygen gradually. It is therefore quite different from "flushing" the abdominal cavity with a large quantity of gas, which is allowed to escape freely, or from the employment of hydrogen peroxid, which leads to the formation of nascent oxygen within the cavity.

PHENOL (CARBOLIC ACID).

Action of Phenol on Absorption. T. Sollman, P. J. Hanzlik, and J. D. Pilcher[5] conclude from carefully conducted and extensive experiments, that when phenol is placed in the alimentary canal the absorption is at first very rapid, but is checked quickly and soon practically

(4) Annals of Surg., March, 1909.
(5) Jour. Pharm. and Exper. Therap., January, 1910.

arrested. The absorption curve varies for different individuals, but the general phenomena are constant, and the average figures for several series agree well. When phenol is placed in the stomach, only traces pass into the intestine; and a large proportion may be removed by gastric lavage even several hours after the phenol is taken. The prolonged presence of phenol, therefore, is not due to re-excretion.

Phenol also checks the absorption of iodid and of alcohol. The retention of phenol is not due to corrosion: for (a) absorption is delayed rather than favored by dilution; (b) the presence of food probably also hinders absorption; (c) alcohol hinders absorption; (d) irritation by formaldehyd favors absorption; (e) injury of the intestinal epithelium by sodium fluorid does not check absorption; (f) a variable amount of phenol may be absorbed after death. Phenol checks absorption even without local contact; for example, when it is inclosed in a ligated loop of intestine.

The degree of absorption is not influenced by the length of the intestional surface to which the phenol is applied. The interference with further absorption is proportional to the amount of phenol which has been absorbed into the circulation, and not to the amount which is present in the alimentary tract. On the other hand, local changes in the intestinal circulation have the most conspicuous effect on the absorption, generally in the sense that local vasoconstriction diminishes absorption, while local vasodilatation increases absorption. Irritation may act in either direction, according to its grade. A large proportion of the unabsorbed phenol exists in the gastric or intestinal wall in such a way that washing removes it only very slowly and imperfectly. This obtains whether the phenol is administered during life or after death.

By measuring the circulation time, it can be demonstrated that absorbed phenol slows intestinal circulation in a specific manner, quite independently of the changes in carotid pressure. The direct local action of the phenol tends to increase the intestinal circulation, but this tendency is quickly overcome by the systemic action when the phenol is absorbed. It appears, therefore, that the inhibitory effect of phenol on absorption is not due to toxic

action on the epithelium, but to a specific slowing of the intestinal circulation.

Phenol and Camphor as an Antiseptic. Some years ago, Cleland, then Regius Professor of Anatomy at the University of Glasgow, called attention to the efficiency of a mixture of pure phenol crystals and camphor in equal parts as a local application for small ulcers, such as those which frequently occur in the mouth and adjacent parts. Those two substances, when mixed together, form a somewhat oily liquid with a pleasant smell. When applied to small ulcers in the mouth, there is little destruction of tissue, and beyond a slight smarting at the time of application, no unpleasantness. The ulcers themselves rapidly heal after the application.

Burton Cleland,[6] a namesake of the Regius Professor, discusses the antiseptic action of this mixture. As it is said that carbolic acid, when mixed with fatty substances, loses its disinfectant properties to a great extent if not entirely, it seemed advisable to test the efficiency of this mixture of carbolic acid and camphor to ascertain whether with the loss of the caustic properties of carbolic acid, there had likewise been a diminution in its bactericidal efficiency. Consequently, at the Bureau of Microbiology the power of the mixture to destroy a young culture of typhoid bacilli was tested. Five drops of such a culture were placed in the mixture for three, six, nine, twelve, and fifteen minutes respectively, and these mixtures were then subcultured, but no growth occurred in any instance.

It is possible that this bland mixture may be of service in other local affections, especially such as are due to bacterial agency. With that object in view, this short note has been prepared, so that those who have opportunities to ascertain its value clinically may do so. In applying it to the mouth, the author has found a small pledget of cotton-wool at the end of a probe dipped in the mixture, and the excess of fluid squeezed out, achieves the result required. Where, however, extensive raw surfaces require to be healed, it is advisable to apply the remedy with care, to prevent any large degree of absorption of the carbolic acid itself.

Phenol and Alcohol in the Treatment of Erysipelas.

(6) Austral. Med. Gaz., Jan. 2, 1910.

Judd[7] reports his results with the treatment of erysipe by means of phenol and alcohol. About eight years ago he began to treat all cases of erysipelas by the method to be described, and since the first case so treated he has seldom failed of a satisfactory result, and has discarded all other remedies in the treatment of these cases. Up to the present time, his statistics show 82 cases treated with 5 failures, 10 delayed recoveries, and 67 complete remissions of symptoms in from twelve hours to four days. These cases have included not only the beginning stages of facial and other forms of erysipelas, but those in the advanced stages in which the area involved has varied from the face only to the face and scalp, with marked general septicemic symptoms.

Almost the first result noticed by the patient is a complete cessation of the unendurable itching, burning, and throbbing. Usually within a few hours the nausea, if any is present, subsides, and within twenty-four hours the temperature sinks to normal, the pulse falls very rapidly in the severe cases from 120 or more beats per minute to nearly normal, the appetite returns, and except for the diminished swelling, which remains for twenty-four or forty-eight hours longer, the patient is relieved of his distressing symptoms.

The technic of the method consists in painting with a swab of cotton the entire surface of the involved area, and extending about half an inch into the surrounding apparently healthy skin, with a 95 per cent. carbolic solution. This is left on until the purplish color of the inflamed area is replaced by a pretty complete whitening of the skin. It is essential to the success of the procedure that this whitening occur before proceeding to the next step in the operation. On the other hand if the whitening is allowed to proceed to a thorough blanching, a burn and a slough of the skin are caused which will prove painful to the patient and add nothing to the efficacy. Where large areas are involved, it is advisable that only a portion be painted at a time.

The second step consists in going over the whitened area very thoroughly with a second swab saturated with pure alcohol. If this swabbing is done thoroughly, the whitened

(7) Med. Record, Feb. 13, 1909.

area becomes once more pink, and the alcohol must be laid on until this is accomplished. After this, other areas are treated with phenol, and neutralized with alcohol until the operation is complete. It is essential that half an inch of the apparently sound skin be included, as the bacteria of erysipelas are found beyond the apparently involved area. In some of the first cases this precaution was neglected, and the author found in twenty-four hours that while he had controlled completely the initially inflamed area, a ring of newly inflamed tissue extended out in all directions much as an advancing ringworm extends. This method includes the painting of the hairy scalp, the eyelids, the mucous membrane of the alæ of the nose, and the nipple of the breast, if necessary.

Judd has failed to note any evil result from the use of phenol in the manner described. There has been no toxic action in any case so far observed, although sometimes the urine is darkened and of a characteristic odor. The temperature rapidly falls, and in severe cases it is frequently necessary to support the patient with stimulation of strychnin and whisky.

In looking over his statistics, it has been interesting to observe that in the majority of cases of failure, the patients have been young children. These have also been the cases in which there has been the greatest number of symptoms of absorption of carbolic acid, which is supposed to be due to the more delicate texture and the more rapid absorbing power of the skin in these young patients.

An interesting observation was made in one of the earlier cases. This was a recurrent, postoperative case of tuberculous osteomyelitis of the tibia, in which erysipelas developed. When the author saw this case in consultation, the patient, a girl of thirteen, was suffering from an inflammation involving the entire leg and part of the thigh. The parts were swollen tremendously, the patient had a temperature of 106° F., was delirious, and had nausea and vomiting, and an imperceptible pulse. The author suggested that as the patient apparently was nearly moribund, it would do no harm to try this treatment. Much to his surprise, he was called on the telephone by the physician in charge the following morning, and informed that the patient had a subnormal temperature, that the pulse was

nearly normal, the child was asking for food, and that he had been stimulating since early in the morning with large doses of whisky and strychnin. The child made an uninterrupted recovery.

Phenol and Camphor in the Treatment of Erysipelas. Davis[8] states that the number of drugs and measures for the local treatment of erysipelas are almost as great as the number of drugs that can be spread on the bare skin. The author has tried them all singly and in combination, and until he finally hunted out his own measure, found nothing satisfactory. True, some cases would do nicely, others not quite so well, and still others would not improve at all. He found that the major portion of the infection was beneath the epidermis, and that some drugs were not absorbed, others only slightly, and some were too caustic or painful in their action.

While all this experimentation was going on in an endeavor to find something that would destroy the infection promptly without any pain or resulting scars, the infection was still traveling on to new fields. The author has overcome this most decidedly by the use of the following mixture:

Carbolic acid, three parts.
Spirit of camphor, six parts.
Alcohol, one part.

The amount of the acid is large. It readily penetrates the entire skin, destroys the infection promptly, leaves no scars, and causes no pain beyond a very little smarting for an instant. The camphor prevents the burning effects of the acid and counteracts any that may be absorbed into the system. The alcohol does the same thing. A larger percentage of alcohol destroys the action too greatly.

This solution must be applied freely with a cotton swab to the infected area and fully an inch beyond the line of demarcation. In mild cases once a day is often enough; in the more severe types two or three times a day. It can be used as desired in any case without the slightest fear of any untoward result or action of any kind. When first applied, it causes an intense reddening of both the healthy and diseased skin, but this is not to be feared. When the infection is destroyed, healing begins; and as it advances, the diseased skin peels off, leaving underneath a perfectly

(8) Month. Cyclopedia and Med. Bull., May, 1909.

healthy, smooth, normal skin. If the skin is uncomfortably hot or dry, the author after applying this solution usually covers the infected area with gauze wrung out of cold sterile salt solution. This will be found very soothing to a large number of these patients.

Phenol in the Treatment of Tetanus. Phillips[9] reports a case of tetanus treated with carbolic acid injections followed by recovery of the patient. As it was impossible to procure the antitoxin, it was considered useless to give injections of magnesium sulphate; and owing to the extremely filthy condition of the patient's bed and home surroundings, spinal injections were abstained from altogether. The progress at first seemed so favorable that it was reasonably hoped that recovery would occur naturally; and it was only after the lapse of seven days, when the symptoms began to increase in severity, the paroxysms in intensity, and life was despaired of, that recourse was had to the treatment by hypodermic injections of carbolic acid. There is no doubt that the effect of the injections was decidedly beneficial, as shown by the marked diminution in frequency and intensity of the paroxysms which followed immediately upon commencing the treatment; but it was not until it became possible to give the injections sufficiently often that a marked and permanent change for the better took place. One week after his admission to the hospital the spasms had completely disappeared, and his jaws could be separated widely and naturally, and mastication of food became possible. There remained only the rigidity of neck and limbs, and this diminished sensibly from day to day during a period of rapid convalescence. The Chinese, to whom the disease is a common and too fatal one, regarded the patient's recovery as a miraculous manifestation of the agency of the devil. It is the author's intention when again called upon to treat a case of tetanus, to begin the carbolic injections from the very first.

PHOSPHORUS.

Phosphorus as a Brain Food. W. Koch[1] has investigated the phosphorus content of the brain in health and

(9) Brit. Med. Jour., Dec. 11, 1909.
(1) Jour. Am. Med. Assoc., May 1, 1910.

disease and finds that even in conditions of extreme exhaustion, the brain is plentifully supplied not only with phosphorus but also with its special form of phosphorus, namely, lecithin. He concludes that there is no evidence of any need to supply phosphorus to the brain in such conditions. The actual amount lost in the exhaustion of general paralysis can not, of course, be replaced on account of the inability of the central nervous system to regenerate. The phosphorus required for the growth of the brain is amply supplied by the phosphorus of daily diet. If desired, the addition of phosphorus-rich foods such as eggs, sweetbreads, liver and some meats, can be made to meet further requirements, and will do far better in this way than dosing with various phosphorus-containing drugs in commercial use. The use of such foods, however, is limited by their richness and their tendency, on account of their fat contents, to disturb gastric digestion. So far as the nervous system is concerned, the addition to the diet of commercial phosphorus compounds, such as hypophosphites, glycerophosphite, phytin, lecithin, etc., is to be discouraged, since there is no conclusive evidence that they affect the growth of the brain, and the amount usually recommended to be thus taken is a very insignificant addition to that supplied by our daily food.

PICRIC ACID.

Picric Acid in the Treatment of Burns. In the treatment of superficial burns, it is becoming quite common to use a solution of picric acid in the proportion of a dram of the acid to a pint of water. Gauze saturated in this solution, and applied to a superficial burn, large or small, will quickly relieve pain and promote healing. The use of the full strength of picric acid is advised, but over a large surface there is too much danger of absorption.

After the burning heat and pain are entirely relieved, an ointment may be prepared of picric acid, 5 grains; bismuth subnitrate, 3 drams; lanolin, 1½ ounces; olive oil, ½ ounce, freely applied. The soothing effect of this, and its active healing properties, are great; and it will do more than any other formula toward preventing the formation

of scars. In fact, in some cases no scar will form at all, but normal healthy skin will appear quickly.

Picric Acid in the Treatment of Pulmonary Tuberculosis. M. Nourtier[2] details a treatment for tuberculosis which was followed up purely as a result of an accidental finding. Bruère, while at the head of a chemical works which made picric acid, was one day asked by a consumptive-appearing man for a position in the works. This was in 1885. He was put to work in the picric acid room, passing from six to eight hours daily under the vats from which the vapor of the acid was constantly arising; at other times he handled dry picric acid; in short, he was constantly inhaling this substance. His physical condition progressively improved, and in fact, at the end of two months he was to all appearances, a well man. This was confirmed by Hue, of Rouen, who in November, 1886, examined him and pronounced the disease "arrested."

Acting upon the experience of this one case, Hue advised other tuberculous patients to inhale the vapor of picric acid at least three hours daily; some remained *in statu quo,* others improved. A tuberculous rabbit exposed to these vapors, was cured. The procedure of administration of this treatment was carried out by placing sixty grains of picric acid and one liter of water in a porcelain or granite ware bowl. The solution is maintained at the boiling point, water being added from time to time to replace that lost by evaporation. The patient inhales this evaporated acid every day for two or three hours at a time. Hue maintains that he has cured several cases by this method. The method has several drawbacks; first, the picric acid attacks metals so that the bowl must be of some impervious material like porcelain; second, the patient's skin becomes yellow so that he must wash after each séance; third, vomiting is sometimes produced by this inhalation so that treatment has to be suspended during such attacks.

In 1900, some experimental work was done on this question by Moutin of Boulogne-sur-Seine, and M. Olivièro, pharmacist in the same city. Guinea-pigs were inoculated with pure cultures of the bacillus of tuberculosis. Those not receiving the picric acid treatment lost weight rapidly

(2) Repertoire de Pharm., No. 5, 1908, Bull. de la Soc. Chim. de la France, No. 2, 1908.

and died; those that were treated improved, although some showed tuberculous lesions and succumbed, showing, however, at autopsy some cicatrization of the lesions. Those that recovered under the treatment were afterwards killed and showed nothing but healed tuberculous areas at the autopsy.

PITUITARY EXTRACT.

Wray[3] remarks that the great disadvantage of adrenalin in the treatment of shock is that though it produces a great rise in blood-pressure and increase in arterial tone, this effect passes off in an hour or so, and the dose has then to be repeated. Any drug which will produce the same effect without the disadvantages mentioned will be a distinct therapeutic advance. This, he thinks, has been discovered in pituitary extract. He has used an extract of the posterior lobe of the pituitary body, a fluid sterilized in the autoclave, each vial of which contains 1 c.c. of a 20 per cent. solution.

The contents of one of the vials were injected intramuscularly into the patient's arm before he had fully recovered from the anesthetic. The effect was almost immediate, and the almost imperceptible pulse soon became large and bounding. This lasted from twelve to sixteen hours, and gradually passed off. Not only did the pulse become larger in expansion, but it also was slowed, and, whereas it had been irregular, it became regular. This effect seems due not only to the action of the drug on the bloodvessels, but also on the heart.

The injection was also given in conjunction with normal saline *per rectum*. There were no signs of any ill effects whatsoever. There was an increase of the urine passed next day after the operation, and it was passed naturally. There was no increased tendency to hemorrhage. The only disadvantage observed was that there was a tendency to reaction after the effect of the injection had passed off; but this was transitory, and the patient was then over the worst period.

POTASSIUM BROMID.

Poisoning by Potassium Bromid. The patient of A.

(3) Brit. Med. Jour., Dec. 18, 1909.

S. Sparks[4] was a woman 35 years of age, in the last month of pregnancy. She suffered from facial neuralgia and was ordered the remedy in question, but on her own responsibility greatly increased the dose specified, consuming four and a half drams in less than twelve hours. When seen on the following day she was in a very drowsy and semicomatose condition. She could be aroused by speaking loudly to her, and she answered apparently without understanding the question in a hesitating and tremulous manner, but was unable to express herself intelligently on account of aphasia. This was extremely well marked, and but for the history and absence of other symptoms would have strongly suggested a cerebral lesion. Thus the medicine was referred to as soup, pastry, as a cushion, and so on. She seemed conscious that she was using the wrong word and after several repetitions of it would relapse into silence. Left to herself she passed at once into a semicomatose state.

The respirations were deep, regular and slightly stertorous, but not slower than normal. The pupils were normal in size and reacted well to light and accommodation. The pulse was 76, quite regular, and of good volume and tension. The fetal heart could be heard quite plainly. The knee-jerks were exaggerated, and although the muscular movements were slow and feeble the patient was able to leave her bed without assistance, and to totter about the room. There was no anesthesia of the skin or mucous membranes and she took food readily and with apparent appetite. These conditions continued without any change for two days. On the third day the aphasia had begun to disappear, and by the end of the fourth day the patient was practically well. She had no recollection of what had happended during the first two days. No treatment was adopted except the administration of five-minim doses of liquor strychninæ every four hours. Three weeks afterwards the patient gave birth to a vigorous male infant, the labor being rapid and uneventful.

POTASSIUM BICHROMATE.

Chronic Ulcer of the Face Cured by Potassium Bi-

(4) Lancet, May 2, 1903.

chromate. The patient of W. Gemmill[5] was a woman of eighty-two years, who had a sore nose for two years. The ulcer ran from the nasion above to the border of the nasal bones below. Laterally, it approached to within a quarter of an inch of the inner canthus of the left and to within three-eighths of the inner canthus of the right eye, and covered most of the bony skeleton of the nose. It had an irregular border with an ulcerated center, and caused no pain, but a constant itching. A 10 per cent. aqueous solution of potassium bichromate was painted on night and morning for a few days, and a marked inflammatory reaction set in in the surrounding tissues, the ulcer being protected by lint held in position by plaster strips. The application was then stopped for a while, and boric-acid ointment was used meanwhile. The ulcer soon took on a more healthy look, and granulations were seen. The whole process was repeated twice more and the ulcer completely healed, a somewhat irregularly pitted scar being left. Two weeks later a small portion of the margin began to break down. This was checked by two more applications. The whole period of cure occupied three months.

Acute Dermatitis Caused by Potassium Bichromate. Two cases are reported by R. P. White.[6] Case 1 was that of a dyer of fifty-seven years, who after four or five weeks at his employment, began to have a roughness of the arms and a swelling of the hands, the backs of which were itchy but not severely so, and he had no pain. The oftener he worked in the dye-house the more severe were his symptoms. At the end of the seventh week an inflammatory rash spread all over his face, and he applied for treatment. On the back of his hands, forearms and arms as high as the rolled-up sleeves, the front of his chest where his shirt was opened under his chin, around his throat and over the whole of his face and on his ears, was a bright red, diffuse, erythematous rash, peeling in places in yellow flakes. The initial lesion appeared to be a scaly papule with a red spreading areola. At the inner side of both elbows the inflammation was intense, and moisture was exuding freely from beneath the thin, scaly crusts.

Case 2 was that of a fellow-workman of thirty years

(5) Brit. Med. Jour., Oct. 23, 1909.
(6) Lancet, Jan. 20, 1910.

whose rash did not appear for three months. He never used gloves, and lifted the material out of the dye-vat with bare hands. In general, his condition was like that of the other man; but his palms were very moist, while those of the other man were horny, thick, and dry, and around their periphery were deep cracks and fissures. The forbidding of the use of chrome in their work, and simple, soothing treatment led to perfect recovery in a few weeks.

The author gives a description of the men's work. A pound and a half of bichromate of potash is dissolved in two hundred gallons of water, and the goods are boiled in this solution an hour. It was from work with this solution that the dermatitis was contracted. In both of these cases the subjective symptoms complained of were very slight. Chrome sores are well known to be painless. These men had only symptoms of slight irritation. As a rule this salt in solution is said not to attack unbroken skin; but if associated with heat and moisture, the preparation is much more active. Many exposed to it in this form are especially liable to irritation of the nasal septum, which fact is said to be due to a deficiency in blood supply. Certain rules are laid down which should be enforced in the conduct of workmen employed in institutions in which chromium salts are used. The employment of some form of grease on the skin is said to be helpful in preventing this form of dermatitis. Any instrument used to lift material out of such solution should have a flange to prevent its running down on the hands. Each workman who comes in contact with the dust of chromium or with its solutions ought to wash all exposed parts freely, and among others the orifices of the nose, with a reducing agent such as bisulphid of soda.

POTASSIUM IODID.

The Treatment of Actinomycosis. A case of typical actinomycosis of the jaw in a man who was in the habit of picking ulcerated teeth with grass stems is reported by Galli-Valerio and Rochaz.[7] A hazel-nut-sized tumor on the edge of the lower jaw was incised, and greenish-yellow pus containing pin-head-sized shining masses released. Ex-

(7) Therap. Monatshefte, January, 1909.

amination showed typical actinomycosis granules. An ointment of potassium iodid was given, and potassium iodid was also given internally, beginning with twenty-four grains, and increasing to thirty-two grains daily. The discharge ceased in eight days. Two weeks later the tumor was much smaller, and after another week could no longer be seen, although a mass of the size of a large pea could be felt. The mouth could be opened freely, the motion previously having been painful. Iodid rash developed, but the treatment was continued for six weeks, when catarrh of the nose forced its discontinuance for a week. It was continued then with one week's interruption for six weeks more. Six months later the patient reported again, and there was no sign of the disease except a small mass of scar tissue adherent to the bone and free from the overlying tissues.

The authors believe that it has been proved that the disease in man usually is acquired from infected grasses, and not from animals. The actinomyces fungus had been found on stems and particularly on glumes of grasses, and in the actinomyces tumors of animals and man. Most of the cases reported in man have been in persons who were in the habit of chewing grass. The parasite occurs as a saprophyte on various grasses, especially on the heads; and Liebmann, planting seeds with actinomyces spores, was able to find the parasite growing on the plants developed from them.

The disease is always to be cured by large doses of potassium iodid if treatment is started early, and even in late cases a cure is not hopeless. Operative treatment is not required usually, but does not interfere with the iodid treatment.

The Treatment of Cataract. Von Pflugk[8] reports excellent results in the treatment of incipient cataract from subconjunctival injection of a 1 per cent. solution of potassium iodid containing 2 per cent. sodium chlorid. Experimental research has also confirmed the benefits of this treatment and explained its mechanism. Since Badal's first recommendation of potassium iodid for this purpose in 1901, 239 cases have been published, including von Pflugk's own experience with 55 and Verderau's with 48.

(8) Med. Klin., Feb. 16, 1908.

Improvement was marked in all but 14 and 6 patients respectively, and the cataract did not progress in any instance. Badal and his followers merely instill and bathe the eye with .025 and 2.5 per cent. solutions, and the results are not so good as with the subconjunctival injection. It is well to commence with their technic, however, and resort to the injections if improvement does not become evident under the instillations. The potassium iodid technic is regarded by von Pflugk as one of the most important achievements of the last few years, and he urges its general adoption and perfection. Capsular and nuclear cataract are not benefited to any extent, the potassium iodid having its main effect on ordinary subcapsular cortical cataract.

POTASSIUM PERMANGANATE.

Flick[9] says that the caustic action of potassium permanganate upon tissue is due to two factors: the liberation of nascent oxygen, and the formation at the same time of potassium hydroxid. The destruction products of the salt are not poisonous, and its caustic action is slow and steady. The author has found that application of the dry powdered crystals in excess makes an ideal means of destroying certain pathologic tissues because it eats away the abnormal tissue and does not affect the healthy.

His method of application is as follows: He takes a piece of adhesive plaster somewhat larger than the lesion to be treated. In this he makes a hole of such a size and shape that the lesion in the skin and a very small strip of healthy skin around it are visible through the opening. This plaster he applies to the skin around the lesion. On top of this he places from five to fifteen similarly cut pieces of plaster, thus making a well above the lesion. This well is filled to the top with finely powdered potassium permanganate crystals. Over the whole he applies an unperforated piece of adhesive plaster as a cover. Over this he puts a bandage. If the condition being treated is an ulcer, as for example lupus, it is destroyed completely in forty-eight hours.

On removing the plaster, there is found a dirty purulent

(9) Muench. med. Wochenschr., Jan. 25, 1910.

detritus, which is washed away. In place of the ulcer there remains a more or less deep crater-like hole whose base is covered with a black mass of manganese dioxid and a yellowish eschar. The borders of the wound are clean cut, and the surrounding tissue is neither swollen nor reddened. If the skin is normal, a drop of water is added to the permanganate, and the plaster is left in place from four to six days. The destructive process goes on either without pain or with but a slight burning, the latter especially when applied to the normal skin. The after-treatment is simple. The wound is dressed dry or with an ointment. The next day vigorous granulations appear, which replace the eschar, and in a few days fill the hole. The scar is smooth, and contracts or hypertrophies but little. The method may therefore be used on the face. It may be applied to any lesion of any size or depth. The author has used it especially for chancroids, fungus, granuloma, decubitus, ulcus cruris, angioma cavernosum, keloid, and carbuncles. It is indicated also in small tumors of the face, nevi, angiomata, lipomata, papillomata, etc. If the tumor is subcutaneous, the hole in the plaster must be made smaller than the apparent size of the tumor. Children's skin is attacked most easily; while that of the extensor surfaces of adults resists most.

The author also uses potassium permanganate crystals in tuberculous bone and joint fistulæ. He has a tube 6 mm. in diameter, and 5 to 10 cm. long, with a funnel-shaped top and a plunger. This is inserted into the fistula leading to the bone, and with the plunger the wound is tightly packed with powdered permanganate, the tube being slowly withdrawn as the packing is done. There is sometimes severe pain, which lasts in the neighborhood of an hour. After from one to two days the mass begins to be discharged, bits of blackened sequestra often coming with it. This treatment frequently results not only in the closing of the fistula, but also in the healing of the tuberculous process. If healing does not occur after one treatment, the process is repeated. The method is contra-indicated in fresh fistulæ with abundant secretion and in fistulæ close to large vessels and nerves.

PROTARGOL.

The Treatment of Ophthalmia Neonatorum. Motais[1] discussing the treatment of ophthalmia neonatorum, pays tribute to the service rendered by nitrate of silver, which has been so long used; he, however, considers it dangerous when ulceration of the cornea is present. He considers that great credit is due to Darier for his researches in the organic compounds of silver—namely, argyrol, collargol, and protargol, the latter of which he considers by far the most valuable.

The method he[2] adopts is as follows: The lids are washed frequently with a lukewarm solution of permanganate of potash of a strength of 25 cgr. to 1,000. If the secretion causes the lids to adhere they should be smeared with iodoform ointment. Every six hours the author uses 2 drops of a 20 per cent. solution of protargol, no matter whether a corneal ulcer be present or not; this never does the cornea any damage. In severe cases with abundant secretion, and especially if the cornea is affected, he uses the protargol drops every three hours, and he considers that accidental injury of the cornea is far less liable to occur than if the lids be painted.

If this treatment is regularly carried out the secretion is diminished from the first day, and in three, or at most four, days there is but little discharge. The protargol is used at half its strength for several days after the case is apparently cured. Should recurrence take place, which he has never seen if the treatment is fully carried out, he reverts to that first recommended. If a corneal ulcer is present it quickly heals. Atropin is also recommended in order to avoid the occurrence of posterior synechiæ. He claims for this treatment that it is simple, without danger, and it gives the best results. He describes 10 typical cases.

PYOCYANASE.

Pyocyanase in Diphtheria. Muhsam[3] describes observations made with this agent, which is obtained from

(1) Bull. de l'Acad. de Méd., May 4, 1909.
(2) Brit. Med. Jour., May 22, 1909.
(3) Deutsche med. Wochenschr., Jan. 23, 30, and Feb. 6, 1908.

cultures of the *Bacillus pyocyaneus,* and consists of an enzyme which has the property of being lytic for diphtheria, cholera, typhoid, the plague, and anthrax bacilli, as well as for staphylococci, streptococci, and gonococci. Tubercle bacilli, however, probably on account of their fatty envelope, are resistant to the enzyme. The author found that, *in vitro,* the growth of diphtheria bacilli is inhibited, and that even small amounts are sufficient to kill large numbers of the organism. In human diphtheria the application of the remedy by insufflation hastens the disappearance of the membrane, and exerts a favorable effect on the general condition of the patients, who also experience much subjective relief. The oral fetor promptly disappears. Pyocyanase should be used only in connection with antitoxin, but the results of clinical tests so far justify further investigations with it.

Grosz[4] has used pyocyanase in the gravest forms of diphtheria, and reports very favorable results. The best results were obtained by spraying the solution into the pharynx and even the larynx, for which purpose a special apparatus had to be constructed. In other cases, inhalation of steam saturated with pyocyanase was tried. In all cases, the pseudomembrane disappeared very much more quickly than is usual in diphtheria, and the comfort of the patients was increased very much. The temperature fell much more rapidly than with the use of antitoxin alone, and all general toxic symptoms were affected very favorably. In several severe cases of croup intubation was made unnecessary, the pyocyanase helping to separate the membrane very effectually. Where intubation was done, the tubes could be removed in much shorter time than has been usual.

The author concludes that the use of pyocyanase deserves to become universal in cases of diphtheria, as it offers the best means of attacking the local lesions of the disease, and shortening its course.

Pyocyanase in Other Throat Affections. Saar[5] has used this preparation as a spray in diphtheritic sore throat, in Vincent's angina and in sore throat of scarlet fever. Every case was diagnosed by bacteriologic examination. Previous laboratory experiments showed that the prepa-

(4) Muench. med. Wochenschr., Jan. 26, 1909.
(5) Deutsche med. Wochenschr., Sept. 3, 1908.

ration had a solvent effect upon the diphtheritic membrane, partly inhibited the growth of diphtheria bacilli in cultures, but did not bind the toxin of that disease. Clinically, the spraying with pyocyanase led to rapid diminution in the extent of diphtheritic membranes; the sore throat of scarlet fever, accompanied by streptococci, was quickly relieved; Vincent's angina was controlled in two or three days by the spray; simple sore throat with exudation upon the pharyngeal and tonsillar mucous membranes was likewise very favorably affected by the new preparation. Pyocyanase cannot take the place of diphtheria antitoxin, but may enable the use of smaller doses of it than usual. It has a distinct bactericidal action, but does not seem to possess antitoxic properties.

QUININ.

Methods of Administration. Palumbo[6] thinks that the prevailing methods of giving quinin in malaria fail to answer their purpose quite so fully as desired. The aim should be to have the blood saturated with the drug just at the time the attack is expected. He accomplishes this by giving the usual dose of one gm. fractioned in five doses, the last being taken just two hours before the anticipated attack. The same amount is taken on the day between the attacks, and after they have subsided he continues with smaller amounts for a few days. In 5 of his 120 cases, the malaria was of the apyretic form, the attacks taking the form of trigeminal or intercostal neuralgia, recurring according to the tertian type, and all cured by two applications of quinin according to the above rule. When a large dose is given at one time, about half of it is eliminated promptly, leaving only the other half to combat the parasites. A much smaller proportion is eliminated early, he says, when given in fractional doses.

G. W. Young[7] reports three cases of malaria occurring in young males. In all, the stomach was intractable to quinin, and they were given injections of ten grains inserted deep into the gluteal muscles, after which the stomach became more tolerant and they were cured quickly.

(6) Gaz. degli Osped. e del. Clin., Aug. 31, 1909.
(7) Lancet, Sept. 11, 1909.

The salt used was the acid hydrochlorid. One of the cases was of the tertian type, and the other two were quotidian.

The Effect of Quinin on Pregnancy. The question which has been debated far and wide by medical men for many years as to the possible effect of quinin upon pregnancy, is brought forward once more by two papers by two East Indian practitioners, Bhupal Sing and Chakravarty.[1] Both of these physicians are tenacious in their belief that in the presence of malarial infection complicating pregnancy quinin is not a dangerous remedy so far as the fetus is concerned. Indeed, they believe that there is far more danger of abortion if the malaria is not combated by quinin than if quinin is used freely.

The first of them states that under these conditions he usually combines bromid of potassium with the quinin, although he is not sure that the use of the sedative is essential. He believes that quinin has a strong tonic action on the uterus, but not sufficient to cause it to empty its contents.

On the other hand, Chakravarty believes that only when the actual labor pains begin does quinin seem to exercise an influence on the uterus, and he believes that it stimulates the contractions after labor. He thinks that during pregnancy the administration of quinin at the time at which the menstrual period should have occurred had pregnancy not taken place, renders the uterus particularly susceptible to the drug, and therefore at such periods it should be used with considerable caution.

Quinin in the Treatment of Epithelioma. Strone[8] has treated epithelioma with local application of quinin stirred with water to a paste and applied with a cotton wad, in a number of cases in which operation was refused. In every instance the quinin had a caustic action on the growth, eating it out until the ulceration was three times or more the size and depth it was at first. He renewed the quinin every second day for four times. The lesion then began to heal over under a simple iodoform dressing, and by the twentieth day had entirely healed. This experience has been repeated too many times, he asserts, for

(1) Indian Med. Gaz., February, 1909.
(8) Med. Klin., Nov. 28, 1909.

it to be a mere co-incidence. The quinin applications are continued until the lesion ceases to spread under its influence. They are also useful, he believes, in palliative treatment of inoperable uterine cancer. The quinin also serves to differentiate cancer from ordinary erosions. With the latter there is none of the destructive action observed with cancer. He advises application of quinin as a preliminary to radical operation, as it aids in clearing up the diagnosis.

RADIUM.

Recent Advances in Radium Therapy. MacLeod[9] observes that the two most important factors in the advance of knowledge concerning radium are that the discovery of the action of radium is intensified if the salt be spread by means of a varnish on a flat surface and so applied to the skin, instead of being placed upon a capsule of glass or aluminum; and the employment of an electroscope to estimate the radio-activity of the radium specimen to be applied.

By means of the special varnish, invented by M. Duane, the composition of which has not yet been made known, the radium salt is fixed on a flat metal plate, or a piece of stiff linen. This varnish is permeable to almost all the rays, and resists the action of heat, water, vaselin and antiseptics, such as ordinary solutions of permanganate of potassium and perchlorid of mercury; but it is unsafe to expose it to absolute alcohol or ether. The metal plates vary in shape, some being circular, while others are square, oblong, or triangular, and in size from 5 mm. up to 6 cm. The pieces of linen vary in size up to several square cm. The plates are fixed on handles, some being made to move upon them by means of a pivot. In addition to these, small rods or spheres are employed to carry the varnished radium into cavities.

The salt of radium which is employed for varnishing upon these flat surfaces is the sulphate of radium, which unlike the bromid is insoluble. Great care is taken in the spreading and fixing of the salt by the varnish, in order to insure that it be evenly spread, and that each

(9) Practitioner, May, 1909.

square cm. of surface have one cgr. spread upon it. The radium sulphate may be employed pure—that is, with a radio-activity of two million; but more usually is diluted by mixing it with barium sulphate, so as to reduce the radio-activity to five hundred thousand or less. In the choice of the apparatus to be employed in an individual case, not only are the weight of the salt of radium employed, its radio-activity, and the total dimensions of the surface over which it is spread, taken into consideration, but also the percentage of the $\tilde{a}$, β, and γ rays emitted by it.

This mode of application has two advantages over the older method of applying it. First, by it the maximum effect of the radium salts on the tissue can be obtained, certain weakly penetrating rays not being cut off by the screen of glass or mica; and, secondly, and more important, a much larger radio-active surface is obtained. It has been estimated that with the radium salt varnished on a flat surface the effect on the tissue is much greater than if the same amount of salt were placed in a glass tube, and that, with the salt spread out, 1 cgr. of radium salt of an activity of a hundred thousand has approximately the same effect as 5 cgr. of a salt of an activity of six hundred thousand inclosed in a glass tube.

The varnished surface is not applied directly to the skin, but often with the interposition of a thin layer of gutta percha to protect it from moisture or discharges; or various screens, consisting of thin aluminum, lead, ebonite, or a layer of wadding 1 cm. thick, covered with gold-beaters' skin, are interposed to cut off the less penetrating rays. By the latter method several brilliant results have been obtained. The $\tilde{a}$-rays are the least penetrating, and are cut off by the thinnest sheet of mica, aluminum, or glass. The same substances cut off the softer β-rays, while hard β-rays pass through them. The γ-rays are the most penetrating, and can pass through lead 4 cm. in thickness. It is these highly penetrating γ-rays which have the most powerful selective action on diseased tissues, while the softer, less penetrating rays have a less discriminating destructive effect, and are more potent in causing superficial inflammatory reaction.

For example, in a case of epithelioma of the lip success-

fully treated by Dominici and Bory, a circular piece of linen 3 cm. in diameter, with 1 cgr. of radium sulphate mixed with 3 cgr. of barium sulphate varnished upon it, and a radio-activity of five hundred thousand, was applied to the lesion. But between it and the skin were interposed a layer of gutta percha 1/10 of an inch thick, a sheet of lead 1/2 mm. thick, eight thicknesses of paper, two layers of gutta percha, and two pieces of plaster. In this way the tumor was subjected to an irradiation exclusively composed of γ-rays of an activity estimated at forty-five hundred, and the secondary radiation, produced by the rays passing through the lead, was intercepted by the paper.

In order to avoid getting an excessive action on the surface of raised lesions by repeated or prolonged exposures, Wickham and Degrais have introduced a method of application which they have graphically named the method of *"Feu croisé,"* and which consists in placing two or more flat "applicators" opposite each other on the tumor, so as to subject the deeper parts of it to the "crossed fire" of penetrating rays from the different "applicators."

The time of application of a specimen of radium depends on various factors, such as the radio-activity and amount of salt applied, the extent of surface on which it is spread, the percentage of the different rays, the presence of some such screen as lead or aluminum between it and the tissue, and the diseased condition for which it is applied. In the early cases the time was estimated in an approximate manner by applying the specimen of radium to one's own forearm or to that of the patient, and observing how long it took to produce a mild reaction; and in estimating the time of exposure in an individual case Wickham and Degrais still advocate the simple expedient of employing a preliminary temporary exposure of the tissue. Experience has taught certain lessons, however, which are a guide in this matter. It has been found that 5 mgr. of pure radium sulphate varnished on a flat surface of 1 square cm., when applied directly to the skin for twenty minutes, can produce a severe reaction with ulceration, the same result being obtained by three applications of ten minutes' duration on consecutive days; and also that 2 cgr. of the sulphates of barium and

radium, of a radio-activity of five hundred thousand, require an application of forty minutes at one sitting to cause ulceration.

In the treatment of vascular nevi, a curative effect can be obtained without the production of a marked reaction, which on account of the scar it leaves is carefully to be avoided; a slight reaction, however, is no disadvantage. Using a flat round plate 6 cm. in diameter, over which is varnished 2 cgr. of the sulphates of barium and radium of an activity of five hundred thousand, with 10 per cent. $\tilde{a}$-, 87 per cent. β-, and 3 per cent. γ-rays, Wickham and Degrais, in the case of pale "port-wine stain," found that the direct application to the skin should be one hour in two seances, while in the case of deep violet nevi it should be two hours in two seances. In the case of raised angiomata, and still more in that of rodent ulcer and epithelioma, the time of application might safely be increased.

The rays from radium have a selective action on certain diseased tissue elements, affecting them much more powerfully than they do healthy tissue, and eventually causing their destruction. The types of cells on which they have the most marked action are the comparatively weakly resistant cells of rodent ulcer, and various other pathologic conditions of the epidermis such as epithelioma of the skin and warty growths. Their destructive action has also been proved to be great in the case of the cells of epithelioma of the lip and mouth. On the cells of cancer, growing from the epithelium of the œsophagus, uterus and bladder, the destructive action on the diseased tissue has not been so marked; but this may be regarded quite reasonably as due to the difficulty of reaching such growths, of watching and controlling the applications and to the great rapidity of the malignant proliferation in these situations, as compared with that which occurs in rodent ulcer.

Another definite effect of the radium rays is that which is exerted upon the sensory nerve terminations; for, like the x-rays, they not only allay itching, but also relieve pain. The bactericidal action of the radium rays is slight and is probably dependent on the rays.

At the time of application of the radium, no definite sensations or signs of inflammation are produced; and it is, as a rule, only after the lapse of ten to fourteen days

that the characteristic reaction sets in. This is associated with all the signs of inflammation which may be limited to the lesion itself, or if a powerful reaction occurs, it may spread to the neighboring skin. In a marked reaction oozing takes place, and a scale of more or less firm scab forms—in some cases, not unlike a rapial crust—which separates naturally in two to four weeks, when another scab may form, or the lesion may dry up, and appear to be completely healed. When the application has been excessive, signs of reaction may reappear much earlier, and erythema may be noticed in twenty-four hours. Vesicles then appear which dry up to form a scab which falls off in a week or ten days, leaving a superficial ulceration. This heals slowly, leaving a scar which is red, smooth, and presents telangiectases like the scar of an *x*-ray burn. The radium reaction is probably the result of an inflammatory process caused by the toxic effect of the dead-tissue elements which have been killed by the rays, acting on a tissue partially devitalized by the same rays.

In addition to the rays which are given off by the radium, emanations in the nature of a gas are emitted also, which confer radio-activity on substances with which they come in contact. These emanations may play an important part in the future developments of radium therapy.

In the experience of almost every one who has employed radium for the treatment of rodent ulcer, there is no other remedy which gives such brilliant results as it does. There appears to be in the radiations from radium something which is more selective in its action on rodent ulcer than the rays from an *x*-ray tube; for cases in which healing has gone on up to a certain point with the *x*-rays, and come to a standstill, have begun to heal again when radium was applied.

Epitheliomata of the skin are also capable of being cured by radium, though not so easily as rodent ulcers, since the cells composing them appear to be more resistent to the radiation than those of rodent ulcer.

Several cases have lately been reported in which epitheliomata of mucous membranes, such as the lip and tongue, have resolved under this treatment also. This is an observation of great importance, as it is a general ex-

perience that the *x*-rays have a feeble action on this type of growth.

All forms of vascular nevi have been treated more or less successfully by radium; and the statistics published by Wickham and Degrais, based on 101 cases, show that by this treatment results can be obtained which are far superior to those obtained by any other means at present at our disposal.

By weak doses of radium, frequently repeated, raised angiomata completely dry up and become decolorized, leaving a pale, supple scar; and this can be accomplished without the production of any marked reaction. This method has a great advantage over excision, electrolysis, and the actual cautery, since it is painless, and can be done while an infant is asleep.

It is in "port-wine stain," however, that the most striking results have been obtained; for up to now these lesions have been the despair of surgeons, and any treatment adopted, if successful in destroying the nevoid tissue, usually resulted in the production of scarring which was as disfiguring as the disease, if not more so. By means of repeated doses of radium, just sufficient to produce a slight reaction and no more, the red or purple tint of the nevus has been diminished greatly, and the color reduced gradually so as to approach that of the surrounding skin without the production of a scar.

With regard to the treatment of the various forms of lupus vulgaris, experience with radium has been disappointing.

Method of Application of Radium. Turner[1] reports his five years' experience with radium. In 1903 he purchased 20 mgr. of radium bromid; in January, 1904, 10 mgr.; and while in the electrical department of the Royal Infirmary, Edinburgh, he has had charge of 15 mgr. All the specimens were in sealed glass tubes except the one of 10 mgr. which was in an ebonite case with a thin mica window. This specimen was also quite pure, with an activity, according to the Currie method of measurement, of two million. To contain this latter specimen he has recently had a small aluminum box made, with a lid which screws on tightly enough to make a water-tight

(1) Lancet, Dec. 25, 1909.

joint. The bottom of this box is only 0.2 mm. thick, so that it is practically quite transparent to the β- and γ-rays. There is a hole in the lid of the box into which an aluminum rod can be screwed so as to facilitate applying the specimen to the interior of the mouth or other cavity.

Radium rays appear to have two chief actions:

1. A specific action on certain pathologic conditions such as rodent ulcers, cancerous nodules, angiomata, keloids, cicatrices, and fibrous contractions.

2. An action producing inflammation and destruction somewhat similar to that produced by caustics and burns.

Sometimes the one action and sometimes the other may be used, and often both are combined. The curative action of radium on a rodent ulcer is an example of its specific action. After a sufficient exposure, the floor of the ulcer will be observed to fill up gradually, the raised edges to subside, the surface to contract, until finally the part will be covered with fresh and rather transparent skin. As a rule, no pain at all will be felt, and there may be but little inflammation, but the part may dry up under a scab. If radium is applied in a sufficient dose to the healthy skin, there will be observed in the course of a few hours to some days, a red spot which will become slightly raised and a little tender. Over this a scab may form, resembling, as Wickham has pointed out, an impetigo crust, which may persist for a time or be replaced by another, but the final result will be good. He has not observed any tendency to form the obstinate and painful x-ray sore.

The dose of radium ought to be measured by the product of the strength of the preparation and the length of the exposure, what would be termed electrically "the ampère hours"; but these qualities would be modified by the presence of screens. The effect of the screens is to cut off the less penetrating rays, and so to protect the skin or superficial tissues; for only those rays which are absorbed by the skin can effect it. All the rays of radium can be cut off by a sufficient screen except the γ-rays, and the latter are few in number. If a superficial condition is to be attacked, use no screen, and give a comparatively short exposure. The $\tilde{a}$-rays now predominate. They are very powerful, but feebly penetrating.

If a subcutaneous condition is to be treated, use a screen of aluminum of about 1/3 to 1/2 mm. in thickness, or a lead one of about 1/10 mm., and give a longer exposure. The thicker the screen, the less the skin will be affected, but the longer the exposure. Only the β- and γ-rays will now be of use, for a thin sheet of note-paper is sufficient to stop all the $\tilde{a}$-rays. If the disease is still deeper, use a lead screen, 1/5 to 1 mm. in thickness, and give a prolonged exposure. Only the hard β- and γ-rays will get through, and they are few in number. A prolonged exposure is therefore necessary. As a rule no after-dressings are necessary. Leave the part alone. Bad results are atrophies and telangiectases. They may be the result of an overdose. Among the conditions in which radium may be of service are rodent ulcer, angiomata, keloids, cicatrices, and fibrous contractions, warty growths, simple ulcers, malignant growths, and pruritus.

The Application of Radium in Body Cavities. A. C. Jordan[2] says that the three types of radiation are classified by common acceptance, as to the effect, on the following plan: The γ-rays have a selective action, destroying diseased cells while leaving normal cells intact, while the $\tilde{a}$- and soft β-rays are said to have a destructive action, not only on diseased, but also on normal cells. To prevent the two latter kinds of rays from reaching the body, a filter of lead 1 mm. thick is suitable.

The author has devised the following method for the use of radium in the cavities of the mouth, throat, esophagus, rectum, uterus, and so forth. The radium is in the form of a solution of radium bromid, which is kept in a flask, to which is attached an air-pump. The air in the flask is kept partially exhausted; and whenever any radium is required the pump is worked till, under the diminished pressure, the solution commences to boil. Radial emanation is carried out with the watery vapor and residual traces of air, into the tube leading out of the flask. This may be collected in a small length of glass tubing inverted over a cap of mercury, and the tubing sealed up in the flame. The original stock solution is never touched. The emanation tube gradually loses its strength. It is possible to draw off daily a radium-equivalent of about 40 mgm. of

(2) Lancet, Dec. 11 and 18, 1909.

emanation without destroying the value of the stock solution. The latter, however, regains its former value, if it has become diminished, by giving it a few days' rest. Every emanation tube is inclosed in a lead "compo" tube, the ends of the metal being closed down over the glass, rounded off, and sealed up. This tube is put in a tube of rubber, with long, stout silk ligature attached to one end, and is placed in the various body cavities in which it may remain for from twelve to twenty-four hours. Various modifications of the rubber tubes may be made to meet the necessities of each individual case.

The advantages of this method over the use of actual crystals of radium are: first, that there is not the risk of losing a valuable crystal tube; and, secondly, that the crystals may fall down to one end of the tube, whereas here the whole length of an emanation tube becomes available. The $\tilde{a}$-rays are supposed to be about one hundred times as powerful as the β- and γ-rays together, and, if possible, should be utilized in therapy.

Makower has shown that we have only to expose a negatively charged conductor—for example, a wire—to the emanation in order to concentrate the maximum possible quantity of active deposit on its surface. It is thus possible without any difficulty to obtain surfaces whose activity per unit area is enormously greater than can be obtained by any other means. Needles rendered thus active could be inserted into any malignant growth where they would be able to exert all of their energy.

The Treatment of Malignant Tumors by Radium. From a study of 600 cases of tumors comprising specimens of each variety, before, during, and after the treatment, Wickham[3] concludes that the malignant evolution of these tumors may not only be arrested for months by radium treatment, but that occasionally these tumors entirely disappear, giving the impression of real cure, the rays having on cancer cells a somewhat selective action. He says that radium cannot at present have other pretensions than to act on lesions which are localized and sufficiently accessible. In cases with generalization the resources of radium are limited to the reduction in size of the principal tumors, to the arrest of hemorrhage and secretion, and to

(3) Brit. Med. Jour., Dec. 18, 1909.

the diminution of pain. If the cancer is localized and accessible, but inoperable, radium, with some rare but very remarkable exceptions, can only diminish or stop the hemorrhages and secretions, and occasionally render the tumor operable; but in spite of these great advantages which result in a prolongation of life, the patient in the end dies of the cancer. The influence of radium diminishes as the tumor becomes less and less accessible. Certain tissues are infinitely less favorably acted on by radium than others, for example, the mucous membranes, especially of the buccal cavity (tongue, tonsils, pharynx, etc.); and in these cases must be added the material difficulty of reaching the region conveniently and applying the heavy screen-filters, and leaving them in position for a sufficient length of time. Lastly, if the cancer is very extensive, a radium-therapeutist has great difficulty in obtaining the stock of radium necessary to act sufficiently in every direction, for the number of doses needed in a number of cases is very high.

The Treatment of Tumors of the Breast, Especially Carcinomata. Wickham and Degrais,[4] in studying the influence of radium on certain tumors of the breast, especially carcinomata conclude as follows: The technical advantages of radium are the following:

1. The ease in application and its painless character make it possible for the apparatus to be left in position for a great length of time without inconvenience to the patient in his daily occupation.

2. The use of lead filtration-screens reduces the radiations in such proportions that their action on the neoplasmic cells is slow, and the patient is not exposed to any harmful irritation of the tissues.

3. The smallness in quantity of the radiations can be compensated for, not only by the long duration of each application of the radium, but also by the method of "crossed fire," which increases the intensity of the action of the radiations in the deeper tissues.

4. These radiations, being composed of rays of extreme penetrating power only, have little effect on the cutaneous surface, but exert their action at a depth.

The practical conclusion from the above considerations is that radium treatment is capable of rendering different

(4) Brit. Med. Jour., May 22, 1909.

kinds of service in the treatment of certain cancers of the breast. The authors further conclude as follows:

1. Radium can cause the retrogression of a cancer of the breast to such a degree as to bring about all the appearance of a cure.

2. Radium can transform an inoperable cancer of the breast into an operable one.

3. Radium can act on recurrences of small dimensions occurring after operation on cancer of the breast.

4. Radium can act on some affected lymphatic glands if they are not too much involved.

5. It can relieve the pain, and diminish for a time the hemorrhage and secretions from cancerous ulcerations, and thus prolong life.

6. It can also be used after surgical operation as a preventive measure.

These conclusions are not of universal application, and are limited to cases in which the growth is sufficiently localized and of small extent; the benefits must not be exaggerated, and a great drawback in practice is the considerable quantity of radium necessary for each treatment.

The Early Treatment of Epithelioma by Radium. Williams[5] states that the first point to consider is the kind of case that is best suited for treatment by radium. The amount of pure radium in the world is small. A single grain of the pure salt, a quantity possessed by few, is not as large as a pea. Therefore, to treat any large area by so small an amount of powder is inconvenient or impracticable. Consequently the best opportunity for the use of radium is in cases in which the affected area is not very large. The next consideration is the depth of the disease. The β-rays, which are present in a larger amount than the γ-rays, have remarkable healing properties but do not penetrate deeply. Their range may be about half an inch to an inch below the surface. In using radium, then, we are limited in two directions, the size and the depth of the affected area. Obviously, this remedy is best adapted to superficial growths when they are small, that is, in the early stage. It is also suitable for cavities, and has the advantage over the x-rays in that it can be used in places inaccessible to them. Within these limitations which

(5) Boston Med. and Surg. Jour., Mar. 11, 1909.

cover only a part of the field suitable for *x*-rays, radium has an undoubted advantage, and this advantage is not based on theoretic grounds alone but is confirmed by clinical experience. The author has compared, for instance, the value of *x*-rays and radium by treating one-half of a superficial new growth and one-half of a tract affected by lupus with one remedy, and the other half with the other, and clinically radium was the better. It is safer because the dosage can easily be exact, and as a rule it is more prompt in its action than the *x*-rays.

The cases of malignant disease best suited for treatment by radium are more especially early epitheliomas. In the majority of such cases, improvement takes place very soon. It may begin within three weeks, and sometimes within one. This improvement is manifested by relief from pain or irritation, by the checking of the growth if it is in an active stage, or its stimulation if it is indolent, or in other ways. Radium is also of great value in keloids.

Some superficial growths of about 1 cm. in diameter heal after a few, say half a dozen, treatments by radium; now and then, after less than this number. On the other hand in cases of long duration, a long course of treatment may be required; but the average duration of treatment is much less than with the *x*-rays, another important advantage for radium.

It is hardly necessary to emphasize the desirability of early treatment when employing this remedy. It should be used first in nearly all of these cases. If for any reason improvement does not take place promptly, operation can follow without harmful delay. The best opportunity for radium is when the growth is small, as already mentioned, and before *x*-rays have been used or operation performed.

But the use of radium is not limited to early cases. It may also be of value in those of long standing. The following is illustrative: C. D. had an epithelioma of seventeen years' duration, which had been operated on several times, and which had also been treated by the *x*-rays when he came to the writer. At this time the new growth covered the temple and a considerable part of the left cheek, but it yielded to treatment by radium. Warts that have been irritated and ulcerate, a small patch that looks like

chronic or subacute eczema but does not heal, or a small sore that persists, particularly on the lip, may take on a malignant character, especially in persons of mature years. These and similar affections of the skin yield, as a rule, to radium even when they resist other treatment. Recurrences take place after treatment by radium as well as after other forms of treatment or operation, but thus far have yielded to further treatment by this remedy.

The table of 69 cases of epithelioma that the writer prepared last June, he thinks, is sufficiently instructive to give again:

	Total.	Healed.	Not healed	Under Treatment.	Discontinued Treatment.
Lower lip	14	11	..	1	2
Lid	9	6	..	1	2
Face	24	20	1	1	2
Auditory canal	1	1	..	..	..
Ear	1	..	..	..	1
Hand	1	1	..	..	..
Nose	19	17	..	1	1
	69	56	1	4	8

The author quotes from the paper read at that time in regard to these cases: "The average duration of the disease before treatment was begun was four years and a half. Fifty-six healed, 1 did not heal, 4 are under treatment, and 8 discontinued treatment; but these last, with 1 exception, were all doing well at that time."

As the length of time that has elapsed after healing is a very important consideration in estimating the value of a remedy, the author states that of the 56 healed cases, 23 have been well for two years or more, 9 of these 23 for more than three years, and 2 for more than four years. Recurrence took place in 2 of the 23 cases; in 1 a year, and in the other two years and a half after healing, but yielded to further treatment.

It should be understood clearly that these results have been obtained by using an efficient amount, 50 mgr. of the pure radium salt.

To carry out treatment by radium properly:

1. Fifty mgr. of pure radium bromid are desirable, but this is difficult to obtain and is very expensive. The author considers that he was most fortunate, over five years ago, in getting 120 mgr. of pure radium. About a year ago he wrote to a firm which has been interested in selling this salt and asked the price of pure radium bromid. The reply was that they had none of the pure salt, and did not believe it existed, but they had some one-sixth as strong. A number of physicians are attempting to treat patients with radium too weak to qualify, and too small in quantity to be efficient, and this will doubtless tend to discredit this new therapeutic agent.

2. The radium should be placed in a capsule, covered with lead except on one side, which is at the end of a long handle, as a protection to the physician. The capsule over which a clean rubber cot for each patient has been drawn for purposes of cleanliness, should then be passed slowly over the area to be treated, or held over the special place for from half a minute to three and sometimes four minutes. The exposure should be made from one to three times a week; less often after healing has begun.

3. The remedy must be used with sufficient courage to obtain results, but with care to avoid harm; for a remedy that is of any value is a two-edged sword, and requires judgment and experience in its use.

Butlin[6] regards it possible by means of radium to promote the healing of epitheliomatous ulcers of very small extent, and to remove the induration around the ulcers. The cure of such conditions appears to be as satisfactory as the cure of rodent ulcers. In cases of epithelioma of any but the smallest extent, we are not yet justified in advising patients whose disease is amenable to operation to try the effect of radium unless there are circumstances in the individual case which render an operation inadvisable. So far as associated affection of the lymph glands is concerned, Butlin has not yet seen anything which would warrant him in believing that the application of radium to the primary disease, even if it were successful, would avert affection of the glands, nor has he seen any case in which undoubted secondary affection of the glands was cured or

(6) Lancet, Nov. 13, 1909.

decidedly benefited by the use of radium. Whether the application of radium over the glandular area before it is obviously affected will later be found to exercise a protective effect on the glands he does not know. At present the glands must be treated, as they have been hitherto, by operation.

The results which he has seen of the treatment of leucoplakia and allied conditions lead him to believe that radium cures them only by substituting thin scar-tissue for them, but does not restore the mucous membrane to the condition in which it was before the development of the disease. Treatment by means of radium in such cases, however, has the great advantage over surgical removal or the use of destructive agents in that it is quite or almost painless, and in that no actual inflammation and no open sore are produced by the applications when they are made by experienced operators.

The Treatment of Vascular Nevi. Jones[7] states that the fact that vascular nevi are favorably influenced by the radiations of radium is now well known, and cases of the successful use of radium in this condition have been recorded by numerous writers. Something still remains to be learned of the details of the procedure to be adopted in the employment of radium in these cases, and the following observations are based upon the treatment of 24 cases in the electrical department of St. Bartholomew's Hospital.

The specimen of radium at the author's command consists of 5 mgr. of radium bromid, with a radio-activity of about fifty thousand, that is to say, of about one-quarter of the strength of the pure salt. It is inclosed in an aluminum capsule or button 1 cm. in diameter, and is so fixed in the capsule as to form an even layer, giving off a uniform radiation from the whole front surface of the button in any position. The application to a nevus is made by fixing the button on the part with a piece of adhesive plaster, and a layer of thin gutta-percha tissue is generally placed between the button and the skin. The time of the application has generally been for one hour, but the writer now thinks that a somewhat longer time, say an hour and a quarter, would be better.

In order to simplify matters, the nevi selected for treat-

(7) Brit. Med. Jour., Aug. 21, 1909.

ment have been small ones of about the same size as the radium button, so that the whole area of the nevus might receive identical treatment. All have been actively growing, florid nevi in young babies, and all have undegone retrogressive changes after the first application of the radium.

The general behavior of a nevus after an application is that a reaction begins in the course of about five days. This reaction shows itself first by an increased redness of the surface, followed very soon by a gradual flattening of the nevus if it has previously been raised; then the surface becomes less florid, a little desquamation or the formation of a thin, dry scab takes place, and this falls off and reforms several times, while the nevus continues to become paler and of more indefinite outline. At last it fades away, and the skin assumes a natural appearance, retaining for some time a faint pink image of the original nevus. No formation of a sore or moist oozing surface has been observed, and the part seems to need no after-dressing. The whole process of evolution takes a month or six weeks, the latter stages being somewhat slow. No pigmentation of the surface has been observed.

The action of the radium is very strictly localized to the surface in contact with the button, and probably this may be explained in part by the fact that the aluminum capsule containing the radium is fixed in a brass holder, which has the effect of encircling it with a ring of brass, which would certainly obstruct the passage of the rays through the rim thus formed. In several of the cases treated, a portion of the edge of the nevus or a small satellite nevus has been outside the edge of the button, and has persisted or has even continued to grow, while the treated central part of the nevus has been retrogressing favorably.

When the nevus has been smaller than the button, the healthy skin surrounding the nevus is acted upon, and an inflammatory reaction is produced, so that the mark of the button is made visible, and has usually remained as a red patch for about three weeks before clearing up.

An interesting point in support of the theory that radium acts more particularly upon young and actively growing tissues is to be found in comparing the effect of radium upon nevi with its effect upon the "port-wine mark" of adults. Although radium is useful in the latter, the

author has found that longer exposures are required to obtain the desired effect, and that the amount of reaction in the skin over a "port-wine mark" is less than is seen in the skin of a baby.

In a case of stellate nevus in a girl of eleven years, an application of the radium button for an hour produced a lively reaction in the skin; but when this had cleared up the stellate nevus was seen to be unchanged, and its little central vessel could be seen to pulsate as before when the surface was viewed through a glass compressor.

Of the total number of cases under review, 12, or one-half, have been completed with a single application. Six have required a second application; 4 are not yet completed, but are markedly altered for the better; and 2 have been treated with a very low-grade sample of radium for a period of two and four hours without any marked result as yet.

Sir Frederick Treves, in a lecture delivered at the London Hospital and reported in *The Lancet,* confined his remarks to cases he himself had seen and examined. He said that radium could cure every form of nevus, "port-wine stains," and pigmented and hairy moles. He mentioned the case of an infant with a nevus the size of a gooseberry on the top of the head entirely cured in a short time; also that of a girl with an angioma of the eyelid the size of a plum, cured with radium. A young woman, with an angioma affecting practically the whole side of the face, who had been subjected to innumerable operations with little success, was cured with the use of radium. He further described the curious way in which radium caused keloid to vanish. Rodent ulcers, which had resisted treatment by Finsen light, *x*-ray, and cataphoresis, were cured by radium.

Epithelioma of the lip and tongue can be cured with radium if applied in early stages. Even in a case of an epithelioma that was ulcerating a cure was effected; also a case of epithelioma inside the mouth and hard palate, and another of the face that had perforated into the nasal passage were cured after many sittings by radium.

The secret of the application of radium lies in the realization that in using it surgically surface is wanted. A little radium spread over a wide surface is much more powerful than a piece of it in a tube. The question of

distance has to be decided, and the length of time of exposure, depending on what results the surgeon wishes to secure.

If the treatment is applied on Monday, for instance, no effect will probably be noticed until the Friday following, when for the first time there will be an inflammatory reaction, then the formation of a crust, which under no condition must be disturbed. The part will become normal in a month or so.

The Treatment of Tuberculosis of the Skin. Wickham and Degrais[8] state that the results obtained with the radium treatment of tuberculous cutaneous affections justify high hopes. The results of injections of solutions of salts of radium also have proved encouraging. One great advantage of radium is that it can be applied in a form to adapt it to the part to be treated. This is particularly useful in the case of lupus of the mucous membranes.

The authors describe their experience during nearly three years and the lessons learned in regard to the indications in the various forms of lupus and ulcerative scrofuloderma. The entire course may be completed in two or three days. The main points are to apply the radium to act powerfully, deep and over a large area, with prolonged supervision of the resulting cicatrix. There does not seem to be any elective action on the lupous cells, which might be an indication for weak dosage.

Thorium and Radium in the Treatment of Phthisis. Chesney[9] has not found that thorium had any effect upon the lung condition in cases of phthisis. Many patients improved greatly so far as their chests were concerned; but as they were under strict sanatorium treatment, it is probable that the pulmonary disease would have improved anyway, and that the thorium had nothing to do with the amelioration. In most of the tuberculous cases treated, thorium was used only when the local throat condition did not seem to be benefiting under ordinary open-air treatment; and therefore, when decided improvement in the throat was noticed after inhalations had been begun, the thorium may be given the credit safely. In some cases, though the lung condition got steadily worse, the throat

(8) Presse Méd., Feb. 19, 1908.
(9) Practitioner, August, 1909.

either remained as it was or got better appreciably. In other cases thorium has not appeared to do any good; but as a rule in these cases the chest also did not get any better, and the patients rapidly got worse.

His experience of treatment with radium is neither extensive nor encouraging. In all but one of his cases, he worked under the disadvantage of being able to apply the treatment himself only once a week, and having to leave the daily treatment to others.

Thorium has the advantage that patients can easily learn to use the inhaler for themselves. In the case of laryngitis, either chronic or acute, occurring during the course of tuberculous disease of the lungs, thorium appears to be a useful remedy; and it can be used with great advantage in non-tuberculous pharyngitis or laryngitis. The solution lasts for a lifetime. Patients can use the inhaler for themselves; and even if it does no good, apparently it can do no harm, which is more than can be said for all remedies which patients use for themselves for indefinite times.

RESORCIN.

Resorcin Poisoning. Nothen[2] has observed 2 cases in the last year in which external application of a resorcin salve caused severe intoxication. One patient was a healthy young man, and the symptoms simulated threatening uremic coma at first. He had used in one day about 30 gm. of the resorcin for seborrheic eczema on his back and limbs. The salve was removed with ether; heat was applied to the extremities, camphor injected, and venesection done, and the patient regained consciousness four hours after the inunction, and recovered. The other patient was an infant with pemphigus, eleven days old. He was found dead in less than twenty hours after the pemphigus patches on head, breast and arms had been dressed with a 3 per cent. resorcin-vaselin salve.

RINGER'S SOLUTION.

The Treatment of Gas Poisoning. Dana[3] uses as his

(2) Med. Klin., June 14, 1909.
(3) Boston Med. and Surg. Jour., May, 1909 and Jour. Am. Med. Assoc., July 10, 1909.

main treatment in gas poisoning the subcutaneous injection of from one to two pints of hot sterile modified Ringer's solution. The injection always was made under the breasts, and the solution used is as follows:

℞.
Calcium chlorid .....Gm. 0.25
Potassium chlorid .....Gm. 0.83
Sodium chlorid .....Gm. 7.50
Distilled water .....Cc. 1,000.00

Other treatments which were instituted were oxygen inhalations, the hypodermic injection of 1/40 of a grain of strychnin sulphate, hot milk by the mouth and sometimes by the rectum, sometimes brandy or whisky, sometimes 1/100 of a grain of atropin hypodermically, and sometimes the patient was surrounded by dry heat. Sometimes ammonium carbonate in 5-grain doses was given once in four hours. The following was a favorite mixture for internal administration:

℞.
Strychnin sulphate .....gr. ⅓
Ammonium carbonate .....gr. xxv
Whisky .....℥v.
M. et Sig. Two tablespoonfuls in water every four hours.

SALICYLIC ACID.

Zavadski,[5] studying experimentally the fate of salicylic acid in the human organism, finds that the theory that this acid combines with glycuronic acid in the blood and tissues, is very probable. As regards the relation of the constitution of this paired compound to the action of ferments, he finds that the compound is not of the glucoside type. A more definite conclusion was not permissible from the facts noted.

Zavadski found, furthermore, that the combination of salicylic and glycuronic acids differed materially from that described by Baldoni. The latter found a crystalline paired-acid with a high melting-point, easily soluble in ether, giving a blue color with ferric sesquichlorid. Zavadski found a syrupy substance but slightly soluble in ether, giving no color with the ferric reagent.

SALT.

Salt in the Control of Hemorrhage. R. von den Vel-

(5) Roussky Vratch, July 4, 1909.

den[6] has studied for a year the use of salt by the mouth or in infusion as a means of controlling hemorrhage. His experience has confirmed the traditions in regard to the influence of salt in this respect. His research on animals and on healthy volunteers as well as in the clinic, has demonstrated that salt enhances the coagulating power of the blood. It is remarkable, however, that it does not have this action in the test-tube; but it is marked in the living subject. He is inclined to attribute this coagulating influence to the mobilization of thrombokinase stored up in the tissues. In 29 cases of hemoptysis, the author obtained excellent results from administration of 5 gm. (75 grains) of sodium chlorid by the mouth, the coagulating properties of the blood being much increased thereby for a period of from an hour to an hour and a half. The effects become evident in a few minutes. If the tendency to hemorrhage returns later, the dose of salt is repeated, or potassium bromid is substituted in the dose of 3 gm. (45 grains), the bromid having further a sedative action. He does not hesitate to keep up this combined sodium chlorid and bromid treatment, giving in the most urgent cases from 20 to 30 gm. of sodium chlorid, and from 12 to 15 gm. of the bromid during the day. Any tendency to bromin intoxication is corrected by the sodium chlorid.

In 9 other cases he administered the salt or bromid by intravenous injection, as he did not wish to irritate the digestive tract or kidneys. This series includes 7 patients with hemoptysis, and 1 each with hemorrhage from varices in the esophagus or bladder, or typhoid lesions in the bowel.

The writer has never witnessed any disagreeable by-effects from this treatment. The beneficial results were apparent in hemorrhage both in the lung and greater circulation. Hemophilia is a chronic defective condition for which a transient increase in coagulating power is of little avail. The hemophilic tendency is probably the result of defective production of thrombokinase, according to the author.

Salt in Cholera. Vassilyeva[7] finds that there is no special advantage in giving intravenous injections of salt

(6) Deutsche med. Wochenschr., Feb. 4, 1909.
(7) Roussky Vratch, Jan. 16, 1910.

solution in cholera, and that some results speak in favor of subcutaneous injections of the same solution. Care must be taken not to give too great amounts of salt solution intravenously, for at times an unfavorable reaction may follow in the shape of chills and a rise of temperature. Small or moderate amounts give as good results as large quantities. Moreover, if the first injection is not followed by some improvement it is probable that it will be useless to repeat the treatment.

Salt as a Prophylactic Against Ankylostomiasis. The results of Chiadini's[8] research have confirmed the prophylactic influence against miners' anemia of saline water in mines. The mines with salt springs seem to be entirely free from the hookworm. These immune mines have a proportion of at least 2 per cent. of salt in the water. Miners coming from infested mines never cause an outbreak of ankylostomiasis in these mines. By artificially rendering the water in the mines saline, it may prove possible to eradicate hookworm disease in endemic foci.

Salt and Eucain Infiltration in Sciatica. Bum[9] describes carefuliy the technic of injecting large quantities of physiologic salt solution containing eucain, 1 in 1,000, into the sheath of the sciatic nerve at the foramen ischiadicum majus in idiopathic sciatica, and gives the following tabulated results in 274 patients thus treated: 169 or 61.7 per cent. were cured; 54 or 19.7 per cent. were improved; 13 or 4.7 per cent. recurred; 38 or 13.9 per cent. were unimproved. Of these cases, 46 were subacute. Of these, 24 or 52.2 per cent were cured; 11 or 23.9 per cent. were improved; 3 or 6.5 per cent. recurred; and 8 or 17.4 per cent. were unimproved.

There were 228 chronic cases. Of these, 145 or 63.5 per cent. were cured; 43 or 19 per cent. were improved; 10 or 4.4 per cent. recurred; and 30 or 13.1 per cent. were unimproved. If the improved and the recurrent cases are classed with the unimproved, the treatment resulted in the 169 cures in 274 cases, or 61.7 per cent., and 105 failures or 38.3 per cent. The number of injections was one in 20 subacute, and 101 chronic cases; two in 21 subacute, and

(8) Policlinico, Jan. 3, 1909.
(9) Med. Klin., July 25, 1909.

114 chronic cases; three in 5 subacute and 9 chronic cases; and four in 4 chronic cases.

The operation of injection or infiltration must be performed with the most rigid antisepsis, and the author seems to think that the effect is produced by the bloodless solution of perineuritic adhesions to the sheath of the sciatic nerve, which is not always complete.

J. Flesch[1] reports 8 cases of sciatica in which he applied Lange's method of local injection of salt solution under pressure. Lange himself has reported 60 per cent. of cures, and Flesch also found that the affection was refractory in some of his cases, although the effects were ideal in others. According to his experience, the loss of the Achilles tendon-reflex on the affected side is a sign that the injections will prove useful. Without the loss of this reflex, none of the other signs, tender points, or Lasègue sign, is decisive. The presence of the knee-jerk excludes tabetic sciatica. Excellent results can be confidently anticipated in suitable cases.

SCOPOLAMIN-MORPHIN.

Scopolamin-Morphin Anesthesia. Thompson and Cotterill,[2] as the result of their observations, believe they are justified in drawing the following conclusions:

1. That, as the result of giving either the single or the three preliminary doses, one does away with fear as a source of danger in the performance of an operation. There can be no doubt that the condition caused by fear is one which predisposes a patient to sudden syncope, which is accountable, at least to a very considerable extent, for the cases of sudden death which form so large a proportion of the casualties which take place during the administration of chloroform. They desire to lay emphasis on this point, as they consider it one of the greatest importance. If due care be taken, it is possible in the majority of cases to administer the anesthetic without the patient waking from sleep. Even in the hospital, where the conditions could not be the most favorable as regards quiet, a large percentage of the patients had no recollection afterward of having been removed from the ward.

(1) Med. Klin., Jan. 3, 1909.
(2) Edinburgh Med. Jour., December, 1909.

2. That the amount of anesthetic required is small. This is undoubtedly true; and, of course, the more the drugs are pushed the less will be the amount of chloroform or ether required. In very many of the cases, after the preliminary incision had been made, no further application of the anesthetic was necessary. In the remaining cases, a whiff of chloroform had to be given from time to time during the continuance of the operation, or small quantities of ether were applied continuously by the open method. They also mention that in no case in which the anesthetic had been removed at an early stage in the operation had they noticed the patient suffer from shock, even though the operation was a serious one, such as the amputation of an arm or a leg. While acknowledging that there are undoubted advantages in the smaller amount of anesthetic required, they want to urge very strongly that the case for or against the use of this method does not rest alone on this question. Even in those cases in which the patient at the time of operation does not apparently react well to the drugs, and in which a considerable amount of anesthetic has to be used, they still can look for the other advantages which they claim.

3. That, owing to the fact that the mucous and salivary secretions to a great extent are inhibited by the drug, the trouble caused by the excessive secretion which so frequently accompanies the administration of ether or chloroform is avoided.

4. That as regards sickness, both during and after the operation, the results are particularly good.

5. That the patients sleep on for several hours after the operation, and thus are spared a great deal of pain and discomfort from which they would otherwise suffer, which factors, when present, cannot fail to aggravate any condition of shock from which the patient may be suffering.

Though they have not had an opportunity of testing the combination in this particular way, the authors suggest that its use previous to operations conducted under local or spinal anesthesia would overcome a disadvantage, possibly not sufficiently recognized, namely, the mental effect upon the patient resulting from his being acutely conscious that he is being operated on.

In conclusion, they further suggest that the use of this

method scopolamin and morphin followed by chloroform or ether, reduces very considerably the dangers and difficulties dependent on the administration of a general anesthetic.

C. M. Nicholson[3] reports his experience with 650 cases of anesthesia with scopolamin-morphin, used as a preliminary to general anesthesia with chloroform or ether. He reviews the published cases of fatalities with this method and concludes that in no one of them can the death be attributed to the injection of scopolamin. His own experiments on animals are summarized, and he finds that they bear the drug well. His conclusions are stated as follows:

1. The effects of the injection of scopolamin and morphin into animals is similar to that of morphin when given alone, with the exception of the injection into kittens in which excitement instead of sleep was produced.

2. Continued repeated daily injections produce no degeneration of the heart, liver, or kidneys. The physical condition is not impaired so long as the injections are given at such intervals as not to interfere with the animal's nutrition. Daily injections of from one to three times the dose given to patients produce no pathologic changes in animals.

3. The toxic dose of scopolamin and morphin correspond very closely to that of morphin alone for the animals used.

4. The autopsy findings in animals which succumb to a toxic dose are the same as those for morphin—that is, congestion of the viscera.

5. Animals seemed to acquire a tolerance for the drugs on long-continued daily administrations.

Death after operation with scopolamin he considers is most likely due to loss of blood, sepsis, or shock. It is very slightly toxic for animals, and certainly produces no degeneration of the heart, liver, or kidneys. He has used it by injection, 1/100 of a grain of scopolamin and 1/4 of a grain of morphin, three-quarters of an hour before giving ether, in 650 cases, avoiding the extremes of life. In 6 per cent. of the cases there was practically no result; but in the remaining 94 per cent. the patients were quieter before, during, and after the anesthesia. There was

(3) Jour. Am. Med. Assoc., Apr. 3, 1909.

an absence of mucus in the throat, no postoperative vomiting, and a diminution of 50 per cent. in the amount of ether used.

Scopolamin-Morphin in Obstetrics. Halpenny and Vrooman[4] report their experience with morphin and scopolamin in relieving the pains of labor in a hundred cases.

Their method has consisted in using hypodermic tablets, the drugs being in separate tablets. The initial doses of morphin sulphate—gr. 1/4—and scopolamin hydrobromate—gr. 1/100—are to be given when dilatation has well commenced and the contractions are occurring at intervals of five to seven minutes. The room is then darkened and made as quiet as possible and the patient allowed to sleep. In the majority of cases after a period of one to two hours' rest, the patient wakes with each pain, only to drop off to sleep again after the contractions have ceased. If the patient wakes completely, a second dose of scopolamin hydrobromate, gr. 1/100, is given, except in neurotic cases, in which, in a few instances, the morphin is repeated either with the hyoscin or alone.

In this class of patients there may be some incoherent talking accompanied by flushing of the face, but they have found no real difficulty or danger connected therewith. This has been noticed by various writers with similar conclusions. They do not endeavor to secure surgical anesthesia. What they do aim at is such a condition that the patient does not remember what happened after the drug was administered. This was secured in about 20 per cent. of cases. In one case forceps were applied (C. H. V.), without the administration of any other anesthetic. In about 70 per cent. of cases the patient rested quietly for some two to four hours, and then awakened with each pain, only to doze off to sleep again between pains. In about one-fourth of these cases, a little chloroform was used at the time of the expulsion of the head.

The drug is not administered when labor is well commenced, and neither is it administered in precipitate cases. The authors agree entirely with the opinion expressed by Fenton in a private communication, who says, "Do not give it within two hours of delivery. Withhold

(4) Canadian Practitioner, August, 1909.

it after the membranes rupture if there is moderate dilatation of the os, and when the cervix is completely dilated, even though the membranes be intact. If labor be progressing unusually rapidly, it is better to give chloroform instead." The objection to the late administration of the drug is twofold—first, the anesthetic effect continues too long on the mother after labor is terminated; and, secondly, it is in such cases that difficulty is found in resuscitating the child.

Effect on the Mother. Apart from the slight mental disturbance already noted, which was of no consequence, no untoward symptoms were observed. Labor was not interfered with, no cases of postpartum hemorrhage occurred, and no untoward after-effects were observed. Rather was it their opinion that in proportion to the success of the anesthesia was the patient freer from symptoms, frequently observed in other cases, of more or less nervous exhaustion. In one case, an observant nurse gave the unsolicited opinion that the patient recovered much more quickly from the effects of labor than in cases in which the drug was not used.

Newell (personal communication), in speaking of the results found in his clinic, says, "I have seen no bad results in any of the cases in which it has been used under my supervision, but some of my colleagues will claim that they have had unfortunate results, though, as far as I can ascertain, there has been no increase in unfortunate symptoms in the cases in which scopolamin has been used over what we used to meet from time to time before scopolamin was heard of."

Effects on the Child. Two premature children where labor was induced for eclampsia were born dead. One child in the occiput posterior position with a prolapsed cord was born dead; and one child was dead about four or five days before birth. All others were born alive, and no difficulty was experienced in having to resuscitate the child except in one case. Here difficulty was met with, but it finally came to all right. No other ill effects were observed.

In conclusion the authors state that they find morphin and scopolamin, when carefully administered, will safely lessen the consciousness of the pains of labor, and in many

cases abolish any remembrance of pain. They have observed no bad effects in the mother, though there may be minor symptoms, as delirium, flushing of face, etc. They have observed only one case in which there was some asphyxia of the child, and in this case the symptoms were not dangerous. They do not think that labor is delayed, but rather that the time is lessened; but they have not had enough cases to judge as to this point. They think the drug should be used only when the patient is in a hospital, or is attended by a good trained nurse; this not because they regard the method as a dangerous one, but because the sympathizing friends would not allow the patient to be quiet enough to get the full benefit. And in addition to this the bystanders would be very much alarmed at the little mental disturbance which occasionally occurs.

Disadvantages of Scopolamin-Morphin Anesthesia. Hatcher[5] remarks that the use of scopolamin and morphin alone and unsupported by chloroform, ether, or other anesthetic, is wholly unsuited for general anesthesia; but, preliminary to chloroform or ether, it has certain advantages, though it renders the problem of anesthesia more complicated, requiring extreme care, judgment, and discretion. There are numerous contra-indications to the use of scopolamin and morphin both in surgery and in child-birth. It seems probable that the combination may have a sphere of usefulness in child-birth as well as in surgery; but there are many details which require perfecting before they can become generally useful even in institutions. It is wholly unsuited in the present state of our knowledge for use in general obstetric practice. The pharmacology of the two drugs, and the interactions of the two, are of prime importance in the study of their uses in surgery and obstetrics. There is no possible excuse for the employment of ready-made mixtures (pills or solutions) of scopolamin and morphin, since each substance must be used only with reference to its individual actions, bearing in mind that these actions may be greatly augmented or modified by the other alkaloid. The danger to the child must be kept constantly in mind, even when the utmost care has been exercised in the selection of cases suitable for the use of the combination in child-birth, and when

(5) Jour. Am. Med. Assoc., Feb. 5, 1910.

small doses are ineffective in inducing the "twilight, sleep," large doses should not be used.

SERUM AND ANTITOXIN THERAPY.

The Oral Administration of Antitoxin. C. T. McClintock and W. King[6] say that inhibition of digestion permits the absorption of toxins and antitoxins from the stomach. By treating children as follows, the oral introduction of antitoxin has given uniform and satisfactory results:

When possible, no food should be permitted for at least four hours before administering the serum. One hour before giving the serum, a glass of 1 per cent. sodium bicarbonate solution is given; and with the antitoxic serum is given one minim of fluid extract of opium, and from four to ten minims of a saturated solution of salol in chloroform. In 19 children and hundreds of animals treated along these lines, serum sickness did not occur. The authors believe that the oral method may be preferred for prophylaxis, because of the ease, the absence of danger, and the small cost. For curative purposes, however, the hypodermic method cannot yet be replaced. In animals, toxins by the mouth may produce a high immunity by absorption of the toxin promoted by the means mentioned.

Antigonococcic Serum.

Herbst thinks that antigonococcic serum has absolutely no effect on acute gonorrheal infections, whether they exist in the lower urinary tract or in any other part of the body. Its value in subacute and chronic cases is very doubtful, although he found a few isolated cases in which the results were somewhat better than those obtained by local treatment; but its value in the treatment of chronic gonorrheal joints is without question. In the past, these painful joints accompanying and following gonorrhea have been most resistant to treatment, both local and general, and he thinks that we now have a remedy which will give rapid and permanent relief.

The antigonococcic sera used by Herbst were made according to the method described by Rogers and Torrey.

(6) Jour. Infect. Dis., February, 1909.

Cultures are grown for from eighteen to twenty-four hours on large slants of ascitic agar. The culture tubes average one inch in diameter. It is essential to obtain a luxuriant growth, and this is best accomplished by planting from an eighteen to twenty-four hour stock culture to a medium of the following composition: Meat-peptone 2 per cent. agar is prepared in the usual way and triturated 1.5 per cent. acid to phenolphthalein. One part of rich sterile ascitic fluid is then added to two parts of the agar.

The full grown uncastrated male sheep (the ram) only is used. In immunizing these animals it has been found advantageous to pursue the following plan: The first inoculation may consist of the first twenty-four hour surface growth from 18 square inches of solid culture medium, emulsified in about 30 cc. of normal saline solution and heated for about one-half hour at 65° C. In immunizing rabbits and goats, a potent serum was obtained, but it was found that the serum itself is decidedly toxic for some individuals and produced rather alarming reactions; hence only rams are used. The immunization of the ram requires ten weeks, one injection being given weekly. The animal is bled to death from the carotid and the serum collected, filtered and tested for sterility. The serum is polyvalent.

The method of administration is by subcutaneous injection, the skin being prepared as for other subcutaneous injections. The abdominal wall was used in all the author's cases because the reaction which follows almost every injection is better tolerated in this part of the body. The amount given at each injection varied from 2 to 6 cc. The injections were given from forty-eight hours to seven days apart, depending on the severity of the reaction. A reaction followed almost every injection, appearing sometimes as a slight urticaria at the site of the injection, at other times in a more severe form accompanied by a dermatitis, enlargement of the inguinal glands, rise of temperature from 1° to 2°, and an increase in the pulse-rate. Most of these symptoms disappeared in from twenty-four to forty-eight hours. In one case, however, the urticaria and dermatitis extended over the entire body, with a high temperature and rapid pulse and continued for five days. The absorption of the serum was rapid; the

tumor which followed the injection disappeared in about fifteen minutes.

Antimeningitic Serum.

flexner's serum.

Statistical Information. Holt[8] states that the serum he used was obtained from a horse which had been immunized by injections derived from many strains of meningococcus. His plan was as follows:

After making the spinal puncture, as much fluid is withdrawn as will come away readily. The head of the patient should be lowered, and his hips raised. It requires some experience to acquire the technic of puncture and injection. The dosage has not yet been measured, and in giving the serum it was administered in cubic centimeters, and not in units. The initial dose is 30 cc.

During the epidemic of cerebrospinal meningitis of 1905, the Board of Health reported 2700 cases of the disease, with a mortality of 73.5 per cent. This treatment has no value in cases not due to the meningococcus. Of 59 patients under two years of age treated by the meningococcus serum, 34 recovered, and 25 died—a mortality of 42.4 per cent. In 88 patients between the ages of two and five, the mortality was 28.4 per cent.; in 104 patients between the ages of five and ten years, the mortality was 15.4 per cent.; in 149 patients between ten and twenty years, the mortality was 27.5 per cent.; in 123 patients, twenty years and over, the mortality was 39 per cent. The results, according to the time of injection, show that of those injected during the first three days, under two years, the mortality was 9 per cent.; of those from two to five years old, the mortality was 22.8 per cent.; of those between the ages of five and ten, the mortality was 12.3; of those between the ages of ten and twenty, the mortality was 24; and, of those over twenty, the mortality was 44.5 per cent. Those injected from the fourth to the seventh day showed a mortality of 21.1 per cent. for those under two years, 32.5 per cent. for those from two to five years, 12.2 per cent. for those between five and ten years, 24 per cent. for those from ten to twenty years, and 37 per cent. for those twenty

(8) Jour. Am. Med. Assoc., Feb. 6, 1909.

years or over. Of those injected after the seventh day, the mortality was 71.4 per cent. for those under two years of age, 27 per cent. for those from two to five years, 22 per cent. for those from five to ten years, 36.6 per cent. for those from ten to twenty years, and 36.6 per cent. for those twenty years or over.

Method of Administration. F. S. Churchill[9] shows how the use of the Flexner serum has reversed the proportions of deaths and recoveries, and greatly reduced the unpleasant sequelæ of meningitis. He also gives his own observations of 41 cases, of which 29 were demonstrated as beyond question due to the meningococcus. In these 29 cases, 13, or 44 per cent., died; but closer analysis shows that lateness of beginning of the treatment in the disease and lack of proper dosage account for the mortality.

Hospital patients do better than those treated at home. They can be watched more closely, the serum can be given more persistently and thoroughly, and more exhaustive laboratory investigations as to the blood and cerebrospinal fluid can be carried out to guide the treatment. The most striking thing in the cases treated early in the hospital is the high percentage of perfect recoveries without sequelæ, and the especially low rate of mortality, it being sometimes as low as 10 per cent. in cases treated within the first three or four days. The course of the disease is shortened materially, and the patient is much more comfortable. Increased phagocytosis can be observed with the successive injections.

Churchill describes the technic of the method of administration. The injection must be made at the pathologic seat of the disease by lumbar puncture. Evacuate 30 to 45 cc. of the spinal fluid, if possible; and if it is at all turbid, inject an equal quantity of the serum at once, without waiting for an examination. If the bacteriologic examination shows the presence of the meningococcus, subsequent injections of the serum should be given. It is better to repeat the dose daily for three or four successive days before stopping the injections, and as a rule it will then be found that the patient is improving decidedly. If the conditions do not improve, repeat the process until bacteria have disappeared, giving occasional injections un-

(9) Jour. Am. Med. Assoc., Sept. 11, 1909.

til no organisms are found in either smears or cultures. Five cases are reported, 2 of them illustrated by charts.

Results from the Serum Treatment of Epidemic Cerebrospinal Meningitis. Fulton[1] reports 22 cases of epidemic cerebrospinal meningitis with 15 recoveries and 7 deaths. In figuring the mortality of the entire series, if we eliminate the chronic and moribund cases, the recoveries would be 83.33 per cent., with 16.66 per cent. of deaths. The total mortality including the chronic and moribund cases is a fraction over 31 per cent. The diagnosis in this series of cases has been confirmed in every instance by a bacteriologic examination. Cultures were made from the fluid obtained at the first lumbar puncture in 20 of the 22 cases. In one case no culture was made, but intracellular diplococci characteristic in morphology and staining properties were found in the stained smear. Of the 21 cases in which cultures were made, a positive growth was obtained upon blood serum in 18, while in the remaining 3 the diplococcus was found in the smear, but failed to grow in culture.

Smears were made always from the sediment of the fluid obtained at the lumbar puncture. In 20 cases the diplococcus was present in sufficient numbers to be found in the smear; in 2 cases they were not observed. In these 2 latter instances, however, they did grow in culture, the failure to observe them being of course due to the fact that not sufficient time was employed searching for them. Here might be mentioned an observation made in one of the later cases which may explain partly the failure to observe the diplococci in smears. In one instance a smear stained by Gram's method showed a very few characteristic intracellular and extracellular diplococci. This same sediment stained by Hastings blood-stain showed much more numerous diplococci both within and without the cells, and it may be that at times in the decolorization by Gram's method, even when the Bismarck-brown counterstain is used, some of the organisms are not sufficiently stained to be recognizable.

Ladd[2] has no doubt as regards the wonderful efficiency

(1) Boston Med. and Surg. Jour., Oct. 22, 1908.
(2) Jour. Am. Med. Assoc., Oct. 17, 1908.

of Flexner's serum in the treatment of epidemic cerebrospinal meningitis, provided it is used on patients not moribund or on those in whom chronic hydrocephalus has not already developed. He confidently believes that statistical reports excluding these cases will show that the present percentage of recovery will contrast favorably with the previously high percentage of deaths.

Sladen[2] thinks that all cases of meningitis in which meningococcic infection is suspected should undergo lumbar puncture and serum injection as early as possible. The serum does no harm in cases of the meningococcic type. It may do good. The course of the disease is changed by the serum. The long drawn out chronic cases are not seen, and the terrible sequelæ, often worse than death, are rare

As to the character of the serum, the rapidity with which signs and symptoms disappear, suggest an antitoxic property; the positive chemotaxis for polymorphonuclear leucocytes, and the promoted phagocytosis are most definite and constant features; finally, the reduction in the number of diplococci, the change in their staining properties, and their loss of viability speak for a bactericidal power, although it is a question if this may not be explained by the phagocytosis.

OTHER ANTIMENINGITIC SERA.

Results from the Administration of Antimeningitic Sera other than Flexner's. Lange[3] has studied the figures of two epidemics of epidemic meningitis, during which 85 cases were admitted into the Augusta Hospital at Cologne. In each case, the diagnosis was confirmed by the discovery of Weichselbaum's meningococcus. During the first and the more severe epidemic, between March and September, 1907, 57 cases were admitted. Fourteen of these were not treated with serum at all. Of these, 13 died (92.8 per cent.), 4 of which were dying on admission. Thirty-seven were treated with serum, but not systematically. Of these, 23 (62.1 per cent.) died, of which one was dying on admission, one died from septic infection of a puncture wound, and two from hydrocephalus. If

(2) Jour. Am. Med. Assoc., Oct. 17, 1908.
(3) Med. Klin., Feb. 21, 1909.

these four are excluded, the mortality is reduced to 51.3 per cent.

During the second epidemic, between December, 1907, and October, 1908, 28 cases were admitted. Of these, 24 were treated systematically with large doses of serum (adults 30 to 40 cc., children 10 to 20 cc.) on the average every other day, but if necessary more often. The injections were intradural. Of the 24, 9 died (37.5 per cent.).

Lange considers the numbers too small to show definitely whether an early resort to serum would give better results than when the serum is given late; but the figures given suggest that this may be so. No harmful effects of the serum injections were observed. The low mortality of the cases in the second epidemic, at any rate in part, is accounted for by the milder nature of the epidemic.

Currie and Macgregor[4] base their paper upon a series of cases of cerebrospinal meningitis observed during the recent epidemic of the disease in Glasgow; 330 cases were seen during two years, of which 105 were treated with antimeningococcic serum. In all but a few cases, each case was bacteriologically verified. Four different sera were used for treatment, with varying rates of case fatality. No opinion is given regarding the relative merits of the sera. Of the 105 patients so treated 39 recovered.

The effects of the serum are considered in two ways, clinically and statistically. Clinically it was found that spontaneous improvement in the condition of patients was liable to occur during the natural course of the disease, alike in the group of acute cases with their critical recoveries, and in the group of chronic cases with their oscillations between betterment and relapse. After serum treatment in the acute phase in certain cases, the temperature suddenly fell and the symptoms passed, but as noted above this early favorable termination was by no means uncommon in untreated cases. In the chronic cases also, the clinical appearances after serum treatment were equivocal. In some cases decrease of restlessness, headache, and general irritability occurred on the day following administration; in other cases two days later. In some cases the improvement was lasting, in others the symptoms re-

(4) Lancet, Oct. 10, 1908.

curred. Some cases again which had several injections of serum reacted differently with the different injections. Relapses were not prevented by serum treatment, either in the acute or chronic phases of the disease. In their influence on the phenomena of the disease, frequent injections and large injections did not differ from injections at longer intervals or in smaller quantity. On these observations the writers base their conclusions that the administration of serum in their cases was followed in individuals by no consistent modification of the natural course of the disease.

Turning now to the statistical side of the question, of the 330 cases 83 patients recovered, a case fatality of 74.8 per cent., which is slightly higher than in epidemics elsewhere. Of the 105 serum-treated cases 68 patients died, a fatality of 64.8 per cent. Of the 225 untreated cases 179 patients died, a fatality of 79.5 per cent. Considered with reference to the number of cases involved and also with reference to the fact that many cases admitted when moribund did not receive serum treatment, the difference between these percentages is barely significant. The mortality was highest among the patients in whom serum treatment was begun during the early days of illness. The writers ascribe this to the special virulence of the acute phase of the disease in the Glasgow epidemic.

The author's conclusions were generally negative with the following important exception: When serum-treated survivors of the first ten days were compared with untreated survivors in respect to case fatality, they found that the treated patients recovered in greater number; and the difference between the respective percentages was sufficient to imply that serum-treated patients who survived the first ten days of illness had a better chance of life. This suggests that the serum, while unable to arrest the disease outright, was yet able to hamper its progress, aiding in this way the natural defenses of the body. Most of the injections were given subcutaneously, and the writers admit that better results are obtained by injection into the spinal theca, after the withdrawal of spinal fluid.

The Antiplague Yersin-Roux Serum.

Choksy's[5] paper is based on the results obtained during the last two and a half years by thirty observers in different parts of India. The main conclusion deduced is that in the Yersin-Roux antiplague serum we possess a useful and efficacious remedy against the plague. The absence of all antitoxic action is responsible for its limited utility. It must, however, be pointed out that a disease like plague, with a mortality of 89.9 per cent. is not likely to yield to serum therapeutics as well as diphtheria has done.

The whole secret of the treatment lies in applying the serum very early. Among patients subjected to this treatment within the first few or even twenty-four hours, it is noticed that the whole course of the disease becomes altered; the normal duration of eight or ten days is reduced to four or five; serious complications of the nervous, circulatory and other systems are averted; the buboes become absorbed, and convalescence is rapid. If the serum is given between twenty-four and forty-eight hours after the onset of the disease its action is not so well marked and after the expiration of forty-eight hours it does not appear to influence the course of the disease perceptibly. Small as these gains appear, they are not to be despised in a disease so virulent as plague.

Antirabic Serum.

The conclusions of an elaborate paper by D. Semple[7] are as follows:

1. By immunizing horses with fixed rabies virus, it is possible to prepare a serum having well-marked rabicidal qualities. Normal horse serum is devoid of these properties.

2. The rabicidal properties of this serum can be tested by mixing it with fixed virus and subsequently using the mixture to inoculate susceptible animals, such as rabbits, subdurally.

3. The indications for the use of such a serum would seem to be as an adjunct to the ordinary method of treatment in severely bitten and late cases. In severely bitten

(5) Brit. Med. Jour., May 30, 1908.
(7) Lancet, June 6, 1908.

cases coming early for treatment, it might also be injected into the wounds and the tissues in their vicinity.

4. The serum of patients after undergoing a course of antirabic treatment also gives evidence of containing rabicidal substances, and the presence of these substances can be demonstrated in a manner similar to that mentioned in the author's second conclusion. Normal human serum is devoid of these properties.

5. The rabicidal substances in the serum of a patient after antirabic treatment are a possible index of the amount of immunity conferred and of the efficacy of treatment.

6. Prolonged treatment confers a higher degree of immunity as judged by the rabicidal effects of the serum or fixed virus, than treatment extended over a shorter period of time.

7. The blood of a patient suffering from hydrophobia fails to infect rabbits when inoculated subdurally.

8. The serum of a patient in the early stages of hydrophobia is capable of prolonging the incubation period for fixed virus when mixed *in vitro,* and inoculated subdurally in rabbits.

Antitoxin of Diphtheria.

Methods of Administration of the Antitoxin of Diphtheria. Morgenroth[8] reviews recent researches which throw light on the mechanism of the action of the antitoxin of diphtheria, and he suggests a way in which to get the greatest advantage from it. He says that all the German antitoxin is now tested for the presence of tetanus germs, as Madsen has recently reported that the serum of a horse five days before the outbreak of severe tetanus was found to contain so much tetanus toxin that 4 cc. caused fatal tetanus in a guinea-pig. The presence of tetanus germs in the antitoxin therefore, is not always due to contamination from without. Other research lately has also shown that contrary to the previously accepted opinion, antitoxin combines with the toxin only gradually, not rapidly, the conditions being thus more favorable the larger the amount of antitoxin injected at first.

It has also been established that the antitoxin is absorbed after subcutaneous injection with surprising slow-

(8) Therap. Monatsh., January, 1910.

ness. Two or three days are required for its total absorption and even then only a fraction of the amount injected finds its way into the blood. Intravenous injection does away with all this at one stroke and should be the rule in severe cases. The desiccated antitoxin does not contain any antiseptic, and it might be dissolved and used for the purpose if carefully filtered. The intravenous route is not popular in Germany for any drugs, but Fraenkel's recent reports of his success with strophanthin injection into a vein may turn the tide in its favor. Intramuscular injections are absorbed much earlier and more perfectly than the subcutaneous. Morgenroth's researches have confirmed this and Neisser states that he has obtained much better results from the antitoxin when it was injected into the gluteal or other muscles.

Morgenroth asserts further that when the blood contains much salt, the toxin does not combine with the antitoxin, which is also the case when the blood or other vehicle gives an acid reaction. In the test-tube the toxin separated again from the antitoxin when the solution was made acid. This separation of the toxin from the antitoxin may be the explanation of the postdiphtheritic paralysis. It also suggests that it may be possible to promote the curative process by administering some other substances, not specific in themselves, but which may loosen up the toxin bound by the protoplasm and allow its extraction and neutralization by the antitoxin. His experiments so far have resulted only in an aggravation of the toxicity; for example, the addition of a solution of pyocyanase to the solution of diphtheria toxin materially enhanced its toxicity for the guinea-pig. It may be possible, however, to discover some substance that will have an opposite effect.

The Intravenous Administration of Large Doses of the Antitoxin of Diphtheria. Berlin[9] discusses his experience with the antitoxin of diphtheria in the Augusta Hospital in Cologne. Though in recent years the mortality had sunk from 30.9 per cent. to 17.5 per cent. in diphtheria, he was not satisfied, and increased the doses of antitoxin, and also gave them intramuscularly and especially intravenously. For this purpose he injected serum preserved

(9) Deutsche med. Wochenschr., Jan. 27 and Feb. 3, 1910.

in a little carbolic acid, in quantities of 8 cc., equivalent to 4,000 units. The amounts injected varied from 4,000 to 16,000 units.

When the intravenous injection was given in 62 cases, there was a striking improvement; in 34, the temperature dropped to normal on the first day; and in 28 it sank more gradually, but was normal on the second day. An especial influence upon the local symptoms in the throat could not be determined. Of 67 cases of pharyngeal diphtheria, 2 died; of 37 cases of laryngeal diphtheria, 11 died; and of 16 cases of septic diphtheria, 10 died. No untoward symptoms were observed as a result of the intravenous use of the serum. The point of injection showed no reaction. Only once was there a small thrombosis, which quickly disappeared. No kidney lesions, which might have been expected from the carbolic-acid injections, were observable. In 8 cases there was marked urticaria. In a few cases there was a slight rise of temperature on the seventh to the ninth day, associated with a general glandular enlargement. Berlin draws the following conclusion:

1. The favorable influence of large doses of serum, up to 16,000 units, cannot be doubted.

2. Intravenous or intramuscular injections produce a more rapid action than subcutaneous.

3. Large doses of serum, even combined with carbolic acid, are harmless.

The Effect of Diphtheria Antitoxin on the Tuberculo-Opsonic Index. Banks[1] gives 30 observations on the effect of the antitoxin of diphtheria on the tuberculo-opsonic index and remarks that there is no great variation in the average index before and after the injection of serum. Nevertheless, a definite rise is apparent in the average index two days after injection, and this gains significance from the even distribution over individual readings. The average index is within normal limits, but more than one-third of the indices are below 0.90, only 6 were above unity, while 5 were below 0.80. Arranging these according to the week in which taken, one-half fall in the fourth and fifth weeks, giving an average of 0.86, and those during the sixth and seventh weeks 0.96. The other factors, age and dosage, seem to have little influence. As regards the former, the

(1) Lancet, June 26, 1909.

average index of those up to and including four years is about equal to the average of those between four and seven years, and also to the total average. In the matter of dosage again, the average of cases receiving from 15,000 to 60,000 units of antitoxin is practically the same as that of those who got only from 6,000 to 12,000. He concludes that in healthy subjects the effect of diphtheria antitoxin on the tubercle index is small, and it is quite possible that the larger variations are due to some hidden tuberculous lesion.

Two points seem to emerge from these observations. First, that there is in the majority of cases a definite rise in the tuberculo-opsonic power shortly after the injection of antitoxin; and, secondly, that during some few weeks after this a somewhat low index to the tubercle bacillus is the rule. Furthermore, these effects are independent of the quantity of antitoxin administered, and probably of the age of the patient.

Hypersensitiveness to the Antitoxin of Diphtheria. R. Waterhouse[2] reports his own personal experience with the antistreptococcic serum as well as the antitoxin of diphtheria. As the result of an injury to the thumb which became infected, a swelling of the arms and axillary glands with severe constitutional symptoms resulted and antistreptococcic serum was injected with immediately happy results. Eighteen months later a diphtheritic infection ensued, for which antitoxin was given, and in two hours a most distressing urticaria set in with pain behind the sternum, palpitation, and faintness, but no vomiting. The antitoxin had been injected in the left arm. These symptoms passed off in two hours, and the next day the author felt all right.

Four years after the throat became infected with a membranous deposit, probably diphtheritic. Antitoxin was given. this time in the right flank, but again in almost two hours the same urticarial symptom followed, together with vomiting and throbbing in the head. The interesting features of these two attacks are the short interval between the injection and the onset of symptoms (not more than two hours on either occasion), the intensity and short duration of the symptoms, the striking similarity between the at-

(2) Brit. Med. Jour., Apr. 18, 1908.

tacks as regards time of onset, symptoms, and duration (though the serums used were from different firms and so probably from different horses), and the fact that on two previous occasions horse serum had been administered to the author without ill effects.

Leukofermantin.

A. Fuchs[4] has employed leukofermantin in 11 cases in his gynecologic practice, with the best results. If the serum is brought intimately in contact with the interior of the suppurating cavity, the suppuration will generally cease within twenty-four hours, and in from one to two days healthy granulation tissue will be formed. The results are not so good in puerperal mastitis, since the abscesses here are frequently disseminated, and require free incision.

In every inflammation leading to suppuration, the polynuclear leucocytes play an important rôle in that they furnish a proteolytic ferment which digests the tissue proteids. In normal blood serum there is found an antibody against the ferment which is able to paralyze its action. A horse serum has now been placed on the market under the name of leukofermantin which contains this antibody in sufficient amounts for therapeutic purposes. It will inhibit the excessive breaking-down of the tissue, and thus hasten the process of absorption and healing.

Marmorek's Serum.

Method of Administration. Scholler[5] says that the general use of Marmorek's serum has the following drawbacks:

1. It is diluted greatly by the general blood.
2. Thereby it is distributed over the entire body, and but a very small portion is enabled to act upon the local focus of disease.
3. The rapid flow of the blood prevents the serum from reaching the diseased tissues, and remaining there long enough to produce effect.

For these reasons, the author considered it better in cases of local tuberculous disease to inject the serum direct-

(4) Zentralbl. f. Gynäk., 1909.
(5) Muench. med. Wochenschr., Aug. 17 and 24, 1909.

ly into the diseased focus, whereby one would expect a stronger and more rapid activity.

He reports 2 cases. In the first, the injection of from 2.5 to 3.0 cc. of the serum caused rapid healing in a tuberculous abscess which had shown no signs of improvement during three months of the usual treatment. The second case was in a patient with an advanced pulmonary and laryngeal tuberculosis. In this case, an abscess of the rib appeared which broke down and formed an ulcer which showed no signs of healing. Three weeks after the injection of 2 cc. of the serum, the wound was healed completely.

The Value of Marmorek's Serum in Tuberculosis. Schenker[6] says that Marmorek's serum has an antitoxic action in the human organism, and works especially well in pulmonary tuberculosis of the first and second grade, as well as in tuberculous disease of the bones, peritoneum, kidneys and bladder. In more advanced stages of pulmonary phthisis, the serum is often capable of stopping the progress of the disease and of improving the general condition of the patient. The secret of success in such cases, however, lies in the persistence in the use of the serum; for the more obstinate and chronic the process is, the longer the treatment called for. In cases where large areas of tissue have been destroyed, the serum is of as little use as any other possible treatment.

The serum may be administered by the mouth or by the rectum, and has been shown to exercise no untoward action whatever. During its use, general hygienic and dietetic measures employed in treating tuberculous infection must not be neglected, plenty of fresh air and sunlight affecting very much the rapidity of the improvement. Schenker concludes that Marmorek's serum is the best means for fighting tuberculous affections that is known to the medical profession at the present time.

Normal Serum.

Mode of Action of Normal Serum. E. C. Hort[7] reports a series of cases treated with (1) local applications of serum, (2) internal doses of serum, (3) both methods

(6) Muench. med. Wochenschr., Jan. 26, 1909.
(7) Brit. Med. Jour., Apr. 11, 1908.

combined with vaccines and (4) vaccines (internally) alone. The cases cover a wide range of lesions, such as fissures, varicose ulcers, bedsores, gastric and duodenal ulcers, pustular eczema, tuberculous hemoptysis and sacroiliac disease. His therapeutic results have been surprisingly good. Brief notes of some of the cases are given. The author says that in cases of arrest by the serum of progressively destructive lesions caused by the tubercle bacillus, it seems highly probable that such arrest is due to an increase in the inhibitory power of the blood.

This raising of the clinical index of the blood's inhibitory power is likely to prove to be the expression of the reaction of the organism to normal serum treatment in all cases of cell destruction, whether due to bacillary invasion or not. It is more than probable that the opsonic index, which after all is only a measure of ingestion prior to lysis of bacteria, will be found to be only a supplemental factor to the true antilytic index of response, which is a gauge not only of antilysis but of restrained lysis. It is conceivable that ingestion and subsequent lysis of bacteria may give rise to an undesirable escape of poisonous enzymes, unless restrained by an antilytic action. Opsonic estimation is and can only be a partial indication of the organism's response to bacillary invasion or vaccine injection. An index of antilytic response may prove to be a far truer guide. The action of normal serum would appear to be a sum of the two opposing actions of an antilytic and auxilytic body. The protein constituent of the serum with which the antilytic body is in combination is still a matter of dispute.

Normal Serum and the Antitoxin of Diphtheria in Hemophilia. Germani[8] found it possible to arrest with serum threatening hemorrhages in a boy nearly four years old, whose maternal grandmother and paternal grandfather were hemophilic. Success was not complete until he supplemented the diphtheria antitoxin first used with fresh rabbit-serum. He is convinced that failures in the experience of others are due to the fact that the serum used was too old, or modified in some way. The injection of 10 or 20 cc. of serum should be repeated and pushed beyond the maximum generally accepted, he de-

(8) Gaz. degli Osped. e delle Clin., June 13, 1909.

clares, and the fresher the serum the better the results. He injected 20 cc. of antitoxin and 75 cc. of rabbit-serum in the course of eighteen days in the case reported.

Normal Serum in Uterine Hemorrhage. W. Busse[9] has treated 10 patients with uterine hemorrhage resisting previous measures, including curetting, by serotherapy. The hemorrhages became so severe that the general health was affected, and he could not find any anatomic cause for them. He injected 10 cc. of human serum subcutaneously. The serum was derived from the blood of healthy patients being treated for displacements, under scopolamin-morphin just before spinal anesthesia. In every instance the hemorrhages ceased entirely or became much less severe after one or two days. Menstruation became normal, and the patients felt well.

He ascribed the hemorrhage in these cases to some general hemorrhagic tendency, probably slight hemophilia. This serum treatment was applied only when local examination was totally negative. There is probably defective production of thrombokinase, and he would prefer animal serum, if such proved effectual. It is possible, he states, that this serum treatment might be used in controlling hemorrhage in cases of myoma or tumors of the adnexa.

Normal Serum in Cardiac Asthenia. Deschamps[1] says that the proper use of serum in minimum doses gives adequate results in the treatment of cardiac asthenia. The injections should be given in the right dorsal region. This treatment does not exclude the means ordinarily employed of cardiac hygiene or a cardiac tonic, but it contributes to the direct stimulation of the pneumogastric and cervical sympathetic nerves and their centers, to sustain the nutrition of the myocardium, and thus to prolong the resistance of the heart, the aim of all therapeutics.

Normal Serum in the Treatment of Chronic Nephritis. Casper and Engel[2] report the results of serum treatment in 11 cases of chronic nephritis. Injury appeared to have been done in no case; in one the excretion of albumin and casts was permanently stopped; in some it was diminished either permanently or transiently, and in

(9) Zentralbl. f. Gynäk., Feb. 13, 1909.
(1) Presse Méd., May 16, 1908.
(2) Berlin. klin. Wochenschr., Oct. 12, 1908.

others no change took place. Almost without exception the general condition was improved and edema present visibly retrograded.

The Serum of Thyroidectomized Sheep.

Its Value in Exophthalmic Goitre. Hoffmann[3] comments on the manifold analogies between osteomalacia and exophthalmic goitre. In the former, the ovary—in the latter, the thyroid—is functioning to excess. In the former, ovariotomy—in the latter, strumectomy—has a curative action. Both are pre-eminently affections of the female sex, and their effect on the phosphorus metabolism seems to be identical. The secretory activity of the ovary seems to rise and fall with that of the thyroid. The thyroid seems to be predominant, probably on account of its influence on the blood-pressure. He knows of no case of osteomalacia with exophthalmic goitre developing later; but many cases are on record in which osteomalacia, or a tendency thereto, developed in the course of exophthalmic goitre. For these and other reasons, he thinks that the serum of thyroidectomized sheep is indicated theoretically in osteomalacia, and he reports a case in which it was given with striking success. His patient was a X-para of forty-five years of age with osteomalacia of about six years' standing, able to walk only a few steps with two canes. In less than two months, under the serum treatment, she was restored to complete health.

SILVER NITRATE.

The Treatment of Dysentery. Hewes[4] remarks that it is well known that dysentery is an acute infectious disease, the local and initial lesions of which are situated in the intestine. Since the extent and severity of the local lesions is an important factor in the disease in prolonging its course and increasing its severity and morbidity, it is clear that any method of treatment which tends to subdue and prevent or limit the extension of the initial local lesions of the condition must be of great value in the amelioration and cure of the disease. By the use of such a

(3) Zentralbl. f. Chir., Apr. 25, 1908.
(4) Boston Med. and Surg. Jour., Apr. 21, 1910.

remedial measure, if it can be found, it would seem possible by its employment at an early stage of the infection to prevent the occurrence of protracted cases of the disease due to extension of the local process in the intestine, and thus to keep all cases in the class known as mild cases, such cases as are seen, for example, where the local lesions, as in the initial stage of all cases, are confined to the rectum, and sigmoid flexure.

Following this reasoning, he decided to try the employment of intestinal irrigation by 5 per cent. silver nitrate solution in the routine treatment of dysentery, hoping that this therapeutic method might prove to be a remedial measure which would subdue and prevent the extension of the initial local lesions of the disease, and by so doing tend to prevent the occurrence of protracted cases and thus prove a practical remedy for the treatment of the malady. In instituting this treatment, he says he was not adopting a new idea. Irrigation with silver nitrate has been recommended before, and used more or less widely in the treatment of dysentery. The only independent element of his procedure was the use of a stronger solution of silver nitrate than that commonly used by those physicians who heretofore have employed this method of irrigation with this therapeutic agent. The details of the treatment used very successfully in his series of 10 cases were as follows:

The patient, when first seen, was given a dose of magnesium sulphate. As soon as this drug had acted, irrigation by silver nitrate was given. The rectal tube was inserted eight to twelve inches, and a pint or more, according to the capacity of the patient to hold the solution, of 5 per cent. silver nitrate injected. The injection was retained by the patient as long as possible, up to half an hour. Then defecation was allowed. Rectal injections of salt solution were given regularly after each movement during the course of treatment. A second injection of silver nitrate was given, as a rule, after a period of two days. In some cases, one injection only was made.

A diet selected with the idea of reducing the amount of fecal food residue was given. The daily contents of this diet were as follows: Lean meat, 300 grams; three slices of toast, with maple syrup; albumin water consist-

ing of the white of eight eggs in water. This was continued for five days. Then the diet was increased by the addition of more toast, butter, tapioca, potato-juice, rice, and macaroni.

SODIUM ARSENITE.

The Treatment of Pernicious Anemia. W. J. Stone[5] reports a case of pernicious anemia in which the blood count had fallen under 300,000, with marked poikilocytosis. The patient apparently fully recovered, having been in perfect health and able to do arduous manual labor for the past year. The treatment was mainly with sodium arsenite, grain 1/10 every four hours during his stay in the hospital, together with injections of normal salt solution for a couple of weeks. The case, Stone thinks, emphasizes the facts that such cases are not altogether hopeless, that the prognosis depends on the degree of red-cell regeneration in the bone-marrow, the age of the individual and the potency of hemolytic poison, and the further fact of the rapid specific influence of arsenic on blood regeneration in certain of these cases. Whether this is through direct stimulation of the bone-marrow activity or through neutralization of the hemolytic poison, or both, remains undecided.

SODIUM CINNAMATE.

Sodium Cinnamate in Tuberculosis. At one time sodium cinnamate was spoken of and written about quite frequently as a valuable agent in the treatment of pulmonary tuberculosis. Lauderer was most enthusiastic in its praise. With Lauderer's death the drug fell practically into disuse, being employed by a small number of physicians and sanitaria only. But there is an ebb and tide in the fortunes of most drugs, and recently sodium cinnamate has been again coming into notice. In a paper read before the Paris Academy of Medicine the drug is spoken of very favorably. It was given a thorough trial by Reynier and Blusson in 21 cases of pulmonary and surgical tuberculosis and the results were positively beneficial. In 10 cases the tubercle bacilli disappeared from

(5) Jour. Am. Med. Assoc., Apr. 18, 1908.

the sputum and in 19 cases the condition in the lungs became practically normal on percussion and ascultation. Their theory is that sodium cinnamate combines with the toxins generated by the tubercle bacilli, converting them into non-toxic compounds. The authors prefer to give the drug in subcutaneous or intramuscular injections.

SODIUM SALICYLATE.

Method of Treating Acute Articular Rheumatism. S. E. Earp[6] reports favorable results in 12 cases of acute rheumatism under the following routine treatment:

The use of calomel is followed by Dorsey's magnesia mixture until the bowels are freely open, when they are kept so. The patient should drink plenty of water. Thirty grains of sodium salicylate should be given each three hours until the pain is relieved, or there are unpleasant head symptoms. The dose then is decreased to 20 grains, and when the joints can be used freely without pain or stiffness, again the dose is decreased to 15 grains four times a day for a week. When the patient considers himself well, 10 grains are given three times a day for two weeks. Oil of wintergreen was applied to the joints twice a day, and they were dressed in cotton and oiled silk or rubber sheeting. There has been some slight deviation from this rule to meet special indications in individual cases.

B. N. Ghosh[7] says that in whatever form salicylic acid is taken it is converted into sodium salicylate in the blood, and that the carbonic and phosphoric acids of the blood are striving constantly for the possession of the sodium. The salicylate has analgesic, antithermic, chologogic, and eliminative properties. Moreover, the bacterium of rheumatism, whatever it may be, is acted upon by the remedy with the same certainty as with mercury in syphilis and quinin in malaria. This action is a local one, and the author decided to treat his rheumatic cases by injection of the salicylate. This has been done by Santini. He gives no explanation, but observes that the tendency to relapse was greater.

(6) N. Y. Med. Jour., May 1, 1909.
(7) Brit. Med. Jour., Mar. 19 and 26, 1910.

Others recommend the deep injection of 1 per cent. solutions of carbolic acid. Still others have used a 10 per cent. solution with great relief to the joint pains. It appears to Ghosh that the curative effects of these methods lie, not in the carbolic acid, but in its conversion into salicylic acid, which in the laboratory is brought about by the action of CO_2 upon carbolates. We know that carbolic acid is transformed into a carbolate in the blood and tissues. Therefore, when the carbolic acid is injected into an inflamed joint, the carbolate comes in contact with the nascent CO_2, the result of the local inflammation, with the effect that nascent salicylic acid is formed, and it asserts its influence at its point of formation. The author makes no mention of his own clinical results.

STROPHANTHIN.

The Dose of Strophanthin. C. A. Crispolti,[8] after numerous experiments, concludes that strophanthin is indicated in cases of heart failure with arrhythmia and low blood-pressure, or in infective processes or myocarditis where the heart is giving out and an immediate effect is required. Given intravenously it should make the pulse slower, fuller and more regular. Dyspnea and cardiac oppression should be relieved, diuresis should set in and the general condition of the patient should improve markedly within a few hours. The dose should be ½ or 1 mgr. in cases of severe heart failure. One injection a day is usually enough, but two may be given (1 mgr. each) in the twenty-four hours, in bad cases; and four or five of these intravenous injections usually suffice. The intramuscular injection of ½ to 1 mgr. of strophanthin once a day is indicated in the less severe cases of heart failure, or up to three times a day in the severe cases when intravenous injection is impracticable. The single daily injection may be continued almost indefinitely, so long as it seems to do good. Crispolti has had no success in giving strophanthin by the mouth. Small doses are without effect. Large doses (2 to 3 mgr.) rapidly produce symptoms of intolerance.

Patients in whom the use of strophanthin is contra-

(8) Policlinico., p. 248, 1909.

indicated are those with high blood-pressure and marked arteriosclerosis, and those with acute or chronic nephritis, or granular kidney. Crispolti believes the drug has a great future before it in the treatment of cases of chronic or acute (shock, hemorrhage) cardiac failure. It is believed to act by stimulation of the intracardiac ganglia and vasoconstrictor nervous centers.

The Intravenous Administration of Strophanthin. Stone[9] asserts that in some favorable cases a single intravenous injection of strophathin will suffice to restore tone to the heart and stimulate diuresis. In other cases, the strophanthin will have to be resorted to time and again to help carry the patient along his downward course with the maximum of comfort. Here the physician will learn the size of the dose of strophanthin that is required to relieve the distress of the patient, and to make the struggling ventricle work effectively enough to carry its load for the time being.

The immediate result of the intravenous administration of strophanthin is to increase the amplitude of the pulse-wave. The frequency of the heart at the same time is slowed within a few minutes, almost if not quite as completely as can be accomplished by the administration of digitalis preparations by the mouth in the course of several days. Therefore when it is desirable to get speedy relief in broken compensation where the heart is rapid and the blood-pressure lower than is needed to retain the balance of the fluids in the body; when the apex and the wrist are far apart; when there is great distress and restlessness, with a sense of impending disaster, strophanthin intravenously will in most cases give immediate relief, which will last from twelve to seventy-two hours, and in some cases even longer; and this relief will be accompanied by free diuresis, or will permit diuretics previously inert to become active once more.

There are dangers in the intravenous use of strophanthin which must not be underestimated. The therapeutic dose and the poisonous dose are near together; and as the elimination of the drug is slow, one can easily get toxic symptoms of slowed pulse and of heart-block from too frequent administration. The previous administration of

(9) Boston Med. and Surg. Jour., Oct. 21, 1909.

digitalis is an almost sure contra-indication to the use of strophanthin. Cases in which the renal conditions are prominent do not respond favorably to the use of strophanthin; and it is in these cases especially, in which digitalis had previously been used to some extent, that the majority of the deaths that have been attributed to strophanthin have occurred. Of the 8 reported deaths which have been ascribed to strophanthin, it is certainly doubtful whether all of them were really due to the drug. Indeed, the experience of one man is worthy of note. A cardiac patient was having his arm sterilized preparatory to the intravenous administration of strophanthin when he fell forward and died. Had death taken place a few moments later, it would have been added to the deaths caused by strophanthin. Nevertheless, the user must bear in mind what Mendel, who is not favorable to strophanthin, has said (though, to the mind of the writer, it is one of the best endorsements of strophanthin): "The medication is brought with a blow directly upon the weakened heart, which is pushed immediately to its highest requirement."

Besides care in the selection of the case, and a knowledge of the previous medication, the administrator must be skillful in the administration, taking care not to let the fluid solution escape from the tissues, or into the wall of the vein. In the one instance, marked painful irritation with swelling and redness, may appear about the point of injection of the strophanthin solution; and, in the latter case, thrombosis may occur, so as to give considerable anxiety and certainly great discomfort. (The digitalis preparations that are used intravenously have the same irritant properties.) Repetition of a milligram dose should not be made under twenty-four hours, except in exceptional cases, and the condition of the pulse should be noted carefully before any such repetition is made. A high blood-pressure is not necessarily a contra-indication, but marked bradycardia always is.

The excretion of strophanthin, according to Hatcher, is probably much greater by the intestine than through the kidneys. In his experiment on rats, where the drug was used subcutaneously, only a very little strophanthin could be found in the urine, while the amount in the intestine was much greater. When it was administered in the food,

practically none was eliminated by way of the kidneys. This in a way explains why strophanthin tends to accumulate in the system, as elimination by the intestinal tract is much slower than by the kidneys.

The Therapeutic Efficiency of Crystalline Strophanthin. Harold C. Bailey[1] says that since the introduction of strophanthin by Fraser, strophanthus has held a reputation as a heart stimulant second only to digitalis, but the variable clinical results obtained have been the cause of much discussion. Until recently it has been used by the mouth almost exclusively in therapeutics; but, when employed by intravenous injection, the results have been more nearly in accord with its pharmacologic action. Experiments still in progress seem to show that the absorption of this drug from the gastro-intestinal tract is very uncertain. After an extensive study of its toxic action on animals in the laboratory of pharmacology of Cornell University, it was investigated clinically in Bellevue Hospital, and the results of these investigations formed the subject of the paper.

The crystalline strophanthin was dissolved in four thousand times its weight of normal saline solution, which then was sterilized by boiling, and placed in serum tubes which were sealed in the flame. In the first series of 20 cases, with 3 exceptions, daily doses of from 3/10 to 5/10 mgr. were given by deep muscular injection, and the medication in many instances extended over a period of several days. All cases of this group showed signs of loss of compensation, and were patients to whom digitalis would ordinarily have been given. It was found that a daily dose of 1/2 mgr. of crystalline strophanthin caused some general improvement in the pulse, a lessening of the dyspnea, and at times some increase in the amount of urine. Sphygmographic tracings were not taken in these cases, and the results in most instances were not at all striking. They did not feel convinced that the results obtained were not due in part at least to rest in bed, freedom from work and worry, and to the hospital régime.

Owing to the entirely unsatisfactory results obtained in the first series of experiments, it was decided to increase

(1) Jour. Pharm. and Exp. Therap., October, 1909.

the dose somewhat when necessary in the second series, the cases of which were classified as follows:

Four cases of mitral disease, 8 cases of mitral and tricuspid disease, 4 cases of aortic regurgitation, 5 of interstitial myocarditis with valvular lesions, 3 with interstitial myocarditis without valvular lesions, 3 with valvular disease accompanied by marked nephritis. With 6 exceptions, these patients had an extreme degree of cardiac insufficiency with marked dilatation. The medication was controlled by a study of the tracings made by a Jacquet sphygmocardiograph, and with numerous blood-pressure readings from a Stanton apparatus.

Bailey reported several cases in detail, and by means of lantern slides illustrated the pulse and other tracings. In conclusion, he stated most emphatically that he did not advise the daily dose to exceed 1 ? mgr. of the crystalline strophanthin as a rule, and under no circumstances should this dose be repeated in twenty-four hours except after careful study of the effects on the circulation. Crystalline strophanthin might be given intramuscularly or intravenously. It should be dissolved in normal saline solution in the proportion of 1 4,000 for intramuscular injections, and 1 6,000-8,000 for intravenous. Crystalline strophanthin is a valuable cardiac stimulant when compensation is broken in chronic interstitial myocarditis, or in any form of chronic valvular disease. Crystalline strophanthin should be used in this way only in emergencies. It is not suited for continuous use; and when continued stimulation is desired, digitalis should be employed.

W. Gilman Thompson believes that crystalline strophanthin is a resurrection remedy for desperate cases, those cases that are brought into the hospital *in extremis*. The effect of a single dose in these cases is simply remarkable. The patients feel better, and there is a great relief of their dyspnea and distress. He reported the case of a woman who was brought to Bellevue Hospital *in extremis*, with great dyspnea, dilated heart and with a tremendous anasarca. She had passed no urine for several days. A dose of strophanthin was given intramuscularly and in twenty-four hours she passed 153 ounces of urine. Another patient came into the hospital in a very desperate condition, caused by myocarditis. Pulmonary edema was pres-

ent and the patient soon became comatose. The breathing became so stertorous that it seemed wrong to allow her to disturb the other patients. They thought it would be a good plan to remove her to another room in which to die. A dose of strophanthin, however, was administered, and the next day she was not only alive, but convalescing and conversational. She lived two or three weeks after. Thompson said that strophanthin is a remedy that does not harm the patients if used with caution, and is a valuable addition to our armamentarium.

N. B. Potter said that he used strophanthin intravenously on one patient, and was so scared at the results that he gave it up. The patient had a chill, and nearly died. He thought that some of the preparations of digitalis used intravenously, like digalin, would give as good results as Bailey had had with strophanthin.

Strophanthin in Pneumonia. A. K. Stone,[2] in writing upon the intravenous administration of strophanthin in other than cardiac disease with special reference to its use in collapse in the course of pneumonia, states that most observers agree with Fraenkel that 1 mgr. of strophanthin properly introduced into the venous circulation produces no unpleasant reaction, and calls forth a prompt response on the part of the failing heart, which shows itself by the slowing and the strengthening of the beat. The change for the better appears in from five to fifteen minutes, and usually lasts from twelve to eighteen hours. The cases most favorable for its administration seem to be those of mitral disease with failing compensation: next, those cases of arteriosclerosis, where there is but little renal involvement, and where the heart has dilated and become incompetent. Pure renal cases with struggling hearts are not only not helped, but often are retarded in their progress. In several cases, where death has occurred in the course of the administration of strophanthin, repeated or frequent doses have been given, or it has been given to patients who have already had digitalis pushed to the limit of safety, and the sudden addition of strophanthin has produced collapse. In the introduction of strophanthin, great care must be taken that the solution be injected into the blood-stream. For the majority of cases,

(2) Boston Med. and Surg. Jour., Aug. 19, 1909.

the median basilic vein at the bend of the elbow will be found to be the one easiest of access.

Liebermeister states as his belief that the use of strophanthin would enable a certain number of severe pneumonia cases to be carried along until the patients were able to eliminate the toxin of pneumococcus, and to get on the road to recovery. Stone cites several cases in his experience which confirm this statement. He does not advocate the use of strophanthin as a specific for desperate cases of pneumonia, but believes that in certain cases of collapse due to cardiac weakness, the physician has in strophanthin a drug which will act so promptly and powerfully, that it will enable the patient to rally, and the heart to resume its work. The large amounts of urine passed by these patients following the crisis of pneumonia, makes it seem that strophanthin has to do with the production of diuresis, by means of which the toxic products are eliminated more rapidly than would otherwise be the case. When the patient has grown weaker and weaker in the course of his disease, whether it be pneumonia or typhoid fever, this drug will have little effect.

STYPTOL.

F. Girardi[3] has used styptol in menorrhagia as well as in metrorrhagia, and reports that its action is to be relied upon. This drug diminished the bleeding in every instance, even in those cases in which hamamelis and hydrastis had been of no effect. The analgesic action of styptol was especially noticeable. The preparation also proved beneficial in cases that had been operated upon. For example, one year after a curettage, styptol promptly diminished both pain and hemorrhage when these symptoms reappeared. This drug was also found valuable in dysmenorrhea, as it not only diminishes the bleeding, but relieves the pain that is apt to appear several days before menstruation. Styptol also has a sedative effect, probably due to a diminution of the irritability of the peripheral nerves, especially those of the genito-urinary system.

(3) Riv. Internaz. di Clin. e di Terapia, 1909.

THYMINIC ACID.

Thyminic Acid in Gout. Fenner[4] states that the use of thyminic acid for the elimination of uric acid, as in gout, has its support on a solid scientific basis. The synthetic manufacture of thyminic acid is now an accomplished fact, and the writer has obtained most excellent results by its use in cases of gout. By the oxidation of the purin bodies, thyminic acid is produced as well as uric acid; and these two substances form a combination in which the uric acid loses its identity and can no longer be precipitated. It is as a constituent of this compound that uric acid circulates in normal blood. In gout the amount of uric acid in the blood may not exceed the normal, the trouble being that its combination with thyminic acid has not taken place, or that its combination has become unstable. If thyminic acid can be introduced into the blood by ingestion or other method in sufficient quantities to retain the free uric acid in circulation, the method of rendering the latter soluble is found.

Turning to the clinical results of the treatment of the gouty state by thyminic acid, the writer is convinced that we possess a very valuable and powerful agent, especially in the prevention of recurrent attacks of acute gout, and in the cure or amelioration of the more chronic forms and of the many ailments which are marked by the excessive formation of uric acid within the system. It is in the prevention of attacks of acute gout, in the obesity so often allied with the gouty state, in gouty eczema, asthma, glycosuria, and stomachic derangements, that thyminic acid attains its maximum of usefulness. A small dose (4 grains), taken daily after meals for a prolonged period, say of three months, and then every alternate week, will in most cases entirely avert the onset of acute symptoms.

When an acute attack of arithritic gout is actually in evidence, thyminic acid is not invariably successful, and the author prescribes mercurials with colchicum, or colchicin with aspirin; then, as the symptoms abate, large doses of thyminic acid are given in conjunction with local treatment by the *x*-ray light bath, and the pain and swelling quickly subside. It is a decided proof of the efficacy

(4) Lancet, Dec. 19, 1908.

of the drug that it renders inert any excess of uric acid, which, in some peculiar way, alcohol in any form often produces.

THYMIC OPOTHERAPY.

R. W. Wilcox said his purpose was to present a record of the results of thymic opotherapy in a field in which the literature was exceedingly meager. The thymus gland, particularly in infancy, has a remarkably full blood supply, and it contains a large amount of nuclein. Consequently it is rich in phosphorus, which exists in the form of nucleinic acid. The purpose of the thymus might be fairly described as directed toward the attainment of adult growth by the individual, and the significance of this statement was illustrated in a remarkable case of which he gives a full report.

On February 15, 1905, the patient, a boy of 14, was referred to him by I. L. Hamant of Norfolk, Conn., under whose care he had been since December 28, 1904. The history was that he had not increased in weight or stature for three years during which time he had been treated by several competent physicians. He had had no illness beyond an occasional sick headache, but he did not have quite the amount of endurance usual in a boy of his age and apparent health. He had a good memory and a bright, active mind, but physically he was undersized and deficient in strength, and although moderately well nourished, was slightly anemic. His weight was 81 pounds February, 1908, his height had increased to 5 feet 7¼

The facts presented seemed to afford ground for the hypothesis that the thymus gland had become prematurely atrophied, and Wilcox suggested that the administration of thymus extract might possibly be therapeutically useful. This was given in doses of 2 grains night and morning, and the results obtained were very satisfactory, for by February, 1908, his height had increased to 5 feet 7 1/4 inches and his weight to 124 pounds. Thus during the three years in which this treatment had been employed (following a period of three years in which there had been no growth) there had been a gain of 9 1/4 inches in height and 43 pounds in weight; and it was also noteworthy that during a suspension of the treatment for

seven weeks in 1906 and for five weeks in 1907 there was absolutely no gain in height.

THYROID EXTRACT.

Thyroid Extract in Tuberculosis. Frugoni and Grixoni[5] discuss at length the relation of the thyroids to tuberculosis. The gland affects the nourishment of the body, a fact to be noted in the treatment of tuberculosis. It increases in size in acute tuberculosis and is often found atrophied in the chronic form of the disease. All agents which injure the thyroid tend to stimulate the advance of tuberculosis. Infants born of tuberculous mothers have thyroids poor in iodin. The authors then tested a series of rabbits and found that those fed on thyroid extract were more immune to tuberculosis than the controls.

Thyroid Extract in Chlorosis. In connection with a discussion of the general physiology of internal secretions F. K. MacMurrough[6] relates the history of a young woman, single, 22 years of age, by occupation a bookkeeper, who had suffered with symptoms of chlorosis since her first menstruation. Fainting spells, heart flutterings, constipation, scanty menstruation, and constant leucorrhea were the more prominent troubles in her case. The blood-count was deficient. The treatment consisted of thyroid extract, 3 grains after meals, a daily quart clyster of normal salt solution, Blaud's pills, the practice of deep breathing, and open-air life. All the symptoms which had before been intractable to other modes, yielded to this method of treatment.

Thyroid Extract in Rheumatoid Arthritis. George Steele-Perkins[7] reports the case of a woman, twenty-eight years old, with rheumatoid arthritis in both knee-joints, with much thickening, and effusion into both joints. Most of the ordinary methods of treatment failed to give relief. Finding that her thyroid was small, he commenced giving thyroid extract, with the result that a month afterwards her knees in no way troubled her.

Thyroid Extract in Nocturnal Enuresis. Leonard

(5) Berlin. klin. Wochenschr., June 14 and 21, 1909.
(6) N. Y. Med. Jour., Apr. 25, 1908.
(7) Lancet, Mar. 5, 1910.

Williams[8] reports 15 cases of nocturnal enuresis. Adenoid vegetations can no longer be regarded as a cause of nocturnal enuresis, the adenoids affording some measure of protection from nocturnal accidents of this nature. When the two conditions are associated, which is often the case, they are both due to a common cause, namely, insufficiency of the internal secretion of the thyroid gland. This insufficiency accounts for the vast majority of cases of nocturnal enuresis in children, as shown by the fact that the exhibition of thyroid extract will in a comparatively short space of time effect not only a cure of the enuresis but afford a great amelioration of many co-existing evidences of ill-health. In the author's cases, belladonna and hyoscyamus, which constitute the sheet anchors of the text-books, have not played any part in the treatment. Where it was thought desirable to employ anything in addition to the thyroid extract, these additions have consisted of tonics such as iron, arsenic, and iodin.

The very remarkable improvement in the general health of his patients under treatment for enuresis by thyroid extract induced him to try the effect of the drug on two or three children who suffered from debility due to other causes. He found that his patients who had not suffered from nocturnal enuresis, under the new treatment with thyroid extract, now had nocturnal enuresis. He comes to the conclusion that the thyroid secretion is a regulator of the mechanism by which urinary incontinence is controlled; an excess of the secretion being almost, if not quite, as deleterious as an insufficiency. In the treatment of enuresis by thyroid extract, the question of dosage is therefore not only of paramount importance, but also of the utmost delicacy. It is essential to success that the initial dose should be very small; that this dose should be increased very cautiously, if at all; and that the minimum dose, which experience proves to be productive of good results, should be steadily persevered with, and re-enforced, if necessary, by such tonics as have already been mentioned.

TUBERCULIN.

The Physiologic and Therapeutic Action of Tuber-

(8) Lancet, May, 1909.

culin. Pogue[9] reminds us that the capsule of the tubercle is a non-vascular fibrous structure which serves two purposes: It protects the tissues against the growing and multiplying bacilli; it also protects those same bacilli from the bactericidal substances that may be present in the tissues, whether those substances are the product of natural or artificial immunity. Recently we have heard much about producing immunity by the use of certain tubercle bacilli products introduced into the system, but investigation shows that any immune bodies thus produced have no action upon the encapsulated bacilli. We cannot get around the fact that Nature's way of arresting and curing tuberculosis is the only method by which we may hope to win, *viz.,* by encapulation; and this encapulation must be complete.

In visible tuberculosis, as of the eye, pharynx, larynx, or mucous membrane, it has long been noticed that some hours after an injection in a small dose of any of the tubercle bacilli products, a congestion is always produced around the tubercles. Such hyperemia aids in the production of new tissue for the capsule, where Nature has already made an attempt to protect the host. This is what might be considered as the second physiologic action of tuberculin. In the stimulation of the production of tuberculo-opsonins, Wright has shown the necessity for the small dose. The same small dose produces the hyperemia around the tubercle. Seven years' experience with tuberculin, used in small doses, has convinced Pogue of its value in properly selected cases. At no time has he found it necessary to increase the dose to anything like that advocated by some writers.

Tubercle bacilli preparations seem to have a double action when introduced into the circulation of a tuberculous individual, especially in the early stages of the disease: (1) The stimulation of the production of tuberculo-opsonins, which opsonins have a certain unknown action on tubercle bacilli that are free in the tissues, so preparing them that they are readily taken up and presumably destroyed by the phagocytic leucocytes. (2) The causing of a hyperemia around the tuberculous area, thus aiding the process of encapsulation. In both cases the small dose

(9) Med. Rec., Aug. 29, 1908.

is called for. We have only begun to learn, in a small way, the value of tubercle bacilli products in the treatment of tuberculous lesions.

As the physiologic and therapeutic action of the drug becomes better understood, its application in suitable cases will become more general. Tuberculin can never be considered a specific in tuberculosis, but at the present time we know it as a most valuable adjuvant to other well-recognized therapeutic agents in the treatment of tuberculous lesions in the early stages of the disease. When tuberculin was first introduced by Koch, its properties and action were practically unknown. Each man who used it seemd to have his own ideas as to dosage and physiologic action. Even to-day we know but little about its physiologic action, but there seems to be a more rational idea as to dosage. The work of Wright has given us an explanation of the action of tuberculin which seems very plausible, especially under certain conditions, *viz.*, when the tubercle bacilli are free in the tissues and can come in contact with the body juices and phagocytic leucocytes as in open tuberculosis. In closed tuberculosis, conditions are different. A diagnosis of tuberculosis can never be made until after tubercle formation has taken place. Not only has tubercle formation taken place, but very probably many generations of tubercles have formed and ruptured before the lesions have become large enough to produce symptoms from which we can make a diagnosis.

The Action of Tuberculin in Producing Toxin Immunization. E. L. Trudeau[1] considers neither the vaccination nor the toxin immunization theories of the tuberulin treatment of tuberculosis entirely satisfactory, owing to our imperfect knowledge as yet of the mechanism of tuberculous infection, and especially of acquired and artificial immunity. If we must have a working theory, however, and must decide between the two, he prefers for the present to hold to the conception of an immunity that is principally antitoxic as produced by the treatment, and to consider tuberculin habituation its essential feature and the best guide to dosage. This does not lead us to expect too much, and he thinks it is more in accord with what we observe clinically as the result of treatment,

(1) Jour. Am. Med. Assoc., Jan. 23, 1909.

and explains its very evident limitations. It is also in accord with experimental facts showing that only vaccinations with living cultures produce any real immunity, and not those with dead germs or chemical products derived from cultures.

Accepting thus the toxin immunization conception as the guide to treatment, instead of measuring the degree of a questionable antibacterial immunity by the opsonic index, or attempting to produce it more emirically by a series of moderate reactions, the severity of which we cannot in any way control, the main features of treatment would be:

1. To raise the degree of tolerance for tuberculin to the highest point attainable in each case by an almost imperceptible and long-continued progression in dosage.

2. To avoid general and focal reactions as much as possible, and to consider them merely as evidences of intolerance.

3. To follow no fixed rule as to the rate of increase or maximum dose to be reached, but to be guided only by the degree of toxin tolerance of each case as shown by the symptoms and general condition, whether the highest dose attainable be only a small fraction of a milligram or a cubic centimeter or more.

Diagnostic Value of Tuberculin. Hamman[2] discusses the tuberculin reaction theoretically, the significance of tuberculin hypersensitiveness, the clinical features of the tuberculin reaction, the criteria of a reaction to tuberculin, the dangers of a tuberculin reaction, the clinical interpretation of tuberculin hypersensitiveness, and the clinical method of demonstrating it, and the cutaneous and the conjunctival tests. He summarizes his considerations practically as follows:

While tuberculin is a valuable aid in the diagnosis of pulmonary tuberculosis, it must be used with care and the results interpreted with caution. The reaction is probably a specific one; but it must be borne in mind that a very insignificant lesion may produce tuberculin hypersensitiveness, and the prevalence of such lesions should be fully realized. A negative reaction is considered decisive information, as is also a focal reaction. In the absence of

(2) Archiv. Int. Med., June, 1908.

a focal reaction, tuberculin hypersensitiveness must be viewed as one phase of the clinical picture, and judgment must not be warped too much by its presence.

As a clinical procedure, no routine scheme can be advised, as the method must be altered to meet conditions as they arise. For adults, some such scale as 0.2, 0.5, 1 and 5 mgr., may be suggested; for young children, 0.1, 0.2, 0.5, and 1 mgr. The cutaneous reaction is too delicate an indicator to be of any value in diagnosis unless the reaction be negative, which it seldom is in adults. The eye reaction gives results more nearly in accord with clinical experience, but by no means of absolute certainty. Hamman does not feel that it can supplant the subcutaneous method. For some time the two should be used together, but not simultaneously. Eye inoculations should precede the subcutaneous by a few days.

Tuberculin in Diagnosis and Treatment. Wilkinson,[3] in his essay which received the Weber-Parker prize of the Royal College of Physicians, 1909, remarks that two chief reasons are urged against the general use of tuberculin in diagnosis: 1. It is supposed that tuberculin may aggravate the condition. 2. Tuberculous lesions are so common in the healthy that a tuberculin reaction does not help the diagnosis.

1. The aggravation is due to the reckless use of tuberculin. Heedless of Koch's express limitations and restrictions, men were found ready and eager to inject tuberculin even into patients who at the best had but a few days to live. It will take years to undo the mischief of that reckless and insane misuse of a valuable remedy. Koch's warning was unheeded in the wild delirium of the moment. Koch stated that the remedy was especially valuable in the early stages of tuberculosis, and numerous witnesses vouch for the truth of Koch's statement that in such cases tuberculin is a most useful remedy. In early cases the benefit of tuberculin treatment has been demonstrated again and again; but, in spite of treatment with the old tuberculin, the disease may relapse, because the remedy has fallen short of popular expectations, it has been decried and condemned as useless and harmful.

2. Is tuberculosis so common that the tuberculin test

(3) Practitioner, February, 1910.

loses its value altogether as a diagnostic agent? This argument is much more solid and more difficult to dispose of, especially when we bear in mind that even a tuberculous lesion in man may be due to the bovine type of the tubercle bacillus, and cause a reaction to tuberculin, although such a lesion has little or no tendency to progress in adult human beings. Now, if we accept the view that at least pulmonary tuberculosis is not related to the bovine type of tubercle bacillus, and pulmonary tuberculosis represents eleven-twelfths of all the tuberculosis that occurs in man we at once reduce this error to one in twelve. As far as observations in adults go, the great majority of tuberculous lesions outside of the lungs are also due to the human type of bacillus. Thus the margin of error is reduced still further, though as yet we cannot fix accurately the degree of this reduction. So far as statistics help us, the bovine type does not appear in more than one-third of the lesions other than those of pulmonary tuberculosis, even when statistics have been drawn from cases in which special pains were taken to discover lesions that were more likely than others to yield the bacillus of the bovine type; and these cases were almost wholly children, not adults. Both the investigations of the German and English commissions, little as they may agree in other points, agree on this point, that even in young children the human type is more commonly found than the bovine type.

Wilkinson concludes that tuberculin is invaluable in the early stages of pulmonary tuberculosis when the symptoms are related to other organs, heart and blood-vessels and blood, digestive organs, especially the stomach, and even the nerves, muscles, and bones and joints, especially symptoms of the rheumatic type. The enormous improvements in the general health, gain in weight, and especially gain in energy, and the complete disappearance of the rheumatic pains, most profoundly impress any one who has witnessed the remarkable change from invalidism to first-rate health. By using tuberculin, we may correct the wrong diagnosis of those who trust to the superficial evidence of physical signs.

The Prognostic Value of the Ocular Tuberculin

Test. Wolff-Eisner[4] comments on the importance of the new tuberculin local reactions as inaugurating a new era in our insight into tuberculosis and into the indications for treatment. He maintains anew that the greatest progress has been realized by the ocular or conjunctival test, which alone of all the tuberculin-diagnostic methods reveals exclusively the active tuberculous processes, not the quiescent. It is much more instructive and delicate, he says, than the sero-reaction in syphilis, the so-called Wassermann test, which is a test-tube technic, not a biologic reaction.

His experience with the ocular test in 4,500 cases has confirmed the fact that a pronounced positive ocular response offers a more favorable prognosis than a weak response or than no response when there are other signs of tuberculosis. The absence of a response in unmistakable tuberculosis shows that the vital processes are flagging. The longer a cutaneous reaction persists the better the prognosis, as the durable reaction indicates active defence on the part of the organism. A negative reaction to the cutaneous tuberculin test in the presence of manifest signs of tuberculosis should be accepted as an indication of an unfavorable prognosis. We thus have come into possession of a means of estimating the prospects of recovery which has proved infallible in his experience, with the single exception that the negative response in a pregnant tuberculous woman may become transformed into a positive response if her system is promptly relieved of the strain of the pregnancy. The complete change in conditions that follows the induced abortion may restore the reacting power and improve the otherwise unfavorable prognosis.

Injurious Effects of Tuberculin in Pulmonary Tuberculosis. Ritter and Wheaton[5] have come to the conclusion from their experience, that in cases of pulmonary tuberculosis without elevated temperature and low resistance, the proper administration of tuberculin is of undoubted efficacy. Tuberculin is capable of producing great injury to the patient, and this injurious influence calls for the greatest discretion in its proper administration.

(4) Med. Klinik., June 13, 1909.
(5) Jour. Am. Med. Assoc., Oct. 23, 1909.

There is frequently increased cough and expectoration following its injection. This in itself is not an untoward symptom. Tuberculin is an expectorant, *par excellence.*

Persistence of such clinical manifestations as general lassitude and physical weakness should cause the discontinuance of its administration. In the presence of a mixed infection, with the high temperature incident thereto, the use of tuberculin is inexpedient. The opsonic findings in dispensary practice are impracticable at this time. Clinical study is absolutely essential in determining the size and frequency of the dose. The authors caution against the use of tuberculin in advanced cases with positive findings. In this stage, alarming results have followed its administration. Tuberculin should not be administered to any patient unless it is possible to obtain an accurate daily record of the case. Pulmonary hemorrhages are contra-indications to the use of tuberculin. Should slight hemorrhages manifest themselves during the treatment, its use must be discontinued at once.

P. K. Pel[6] states that tuberculin is still in the period of trial. He has been unable to acquire much enthusiasm for it. There are so many unaccountable by-effects, such as headache, fever, insomnia, rheumatoid pains, loss of appetite and weight, acceleration of the pulse, and general depression, while acute exacerbations or complications of the tuberculous process may be encountered, as also an individual hypersusceptibility to tuberculin. The course of treatment is so long, so complicated, the indications are so restricted, and there are so many contra-indications, that he declares the failure to institute tuberculin treatment is not a sin of omission for the present. The clinics, hospitals and sanatoriums should make a point of comparative and critical study of tuberculin treatment to place it on a solid basis.

Limitations of Tuberculin. Power's[7] results point to the conclusion that new tuberculin, given by the mouth in small doses, is useful in the milder cases of surgical tuberculosis. It is often sovereign against the chronic sinuses which are formed so often after operations on tuberculous tissues, troublesome cases in which the wound nearly

(6) Berlin. klin. Wochenschr., Sept. 20, 1909.
(7) Brit. Med. Jour., Sept. 18, 1909.

heals, but not quite, and in which it breaks down time after time on the smallest irritation. It is valuable in enlarged cervical glands which have not undergone extensive caseation or suppuration. It has failed to give any relief to patients suffering from tuberculous peritonitis, tuberculous disease of the joints, and inflammation of the bones due to tuberculous infection.

Determination of Opsonic Index not Necessary in the Administration of Tuberculin. Landman[8] gives a review of the history of Koch's tuberculin. He then remarks that during the last few years there has been a considerable revival of interest in the tuberculin treatment. This has been due in England chiefly to the researches of Wright on opsonins and the application of his opsonic index determinations to the treatment, placing it in a line with the treatment by other vaccines. But it must not be forgotten that many physicians have continued to use tuberculin quite independently of Wright's work on the subject. The detailed method associated with Wright's name for the determination of the opsonic index is not an essential part of the therapeutic application of tuberculin. Previously the tuberculin treatment had been regulated by other clinical signs, including pulse, temperature, patient's aspect, local symptoms and signs; and prolonged experience justifies the statement that these clinical signs will suffice, apart from opsonic index determinations.

The complexity of the technic of Wright's method is also an insurmountable difficulty in many cases, and detracts greatly from its general utility. The margin of error in such a complicated process must necessarily be considerable, and this fact must also be taken into consideration in estimating the practical value of opsonic index determinations. The question of the utility of the method in practice must therefore still remain an open one. Wright's work, however, has given a fresh start to the active immunization method of the treatment of tuberculosis. and what we particularly owe to Wright is the demonstration that small doses of tuberculin are effectual, and that large ones are unnecessary.

The peculiar action of the tubercle bacillus, as shown

(8) Lancet, Apr. 10, 1909.

by the slowness and chronicity of the lesions which it produces, the tendency to spontaneous healing of tuberculous foci by caseation and encapsulation, place this organism on a somewhat different footing from other organisms as regards the process of immunization; and the dosage of tuberculin may differ from that of the other vaccines. There is little doubt, however, that in certain cases of localized tuberculosis, such as lupus, tuberculous joints, glands and genito-urinary tuberculosis, improvement has followed the use of tuberculin according to Wright's method.

Landman has observed 12 patients, and concludes that the results cannot be said to show anything conclusive. Several patients seemed to derive benefit from the tuberculin inoculations. The injections raised the opsonic index in several cases, but the negative phase was not at all constant. It is difficult to say whether the favorable results observed might not have been due to the open-air treatment alone. No harmful results were noticed after the inoculations in one patient.

Tuberculin in the Tuberculosis of Children. Engel[9] gives a detailed report of his experiences with tuberculin in the children's clinic at Düsseldorff. The principle followed was first to accustom the child to a large dose, and then to continue to treat him with this dosage. The children are kept in bed at first, and the temperature is taken in the rectum every two hours. The injections are made between the shoulder-blades. The extent of the tuberculous process determines the reaction, independent of the age of the child. Typical child tuberculosis is distinguished by a great tolerance for tuberculin. The tendency to reaction grows less when the dose, which was borne without reaction, is repeated several times before increasing it. When the optimum maximum dose once is determined, the children are treated afterward as out-patients, the injections repeated at graduated intervals to prevent too vigorous reactions. When the child tolerates 0.01 cc. tuberculin, the reaction to the v. Pirquet test usually ceases. This test may serve as a guide for the dosage of tuberculin.

The author's experience shows that it is incorrect to

(9) Beiträge z. Klin. der Tuberk., Sept. 18, 1909.

speak of latent tuberculosis in children. The affection may be occult and non-localizable in a child, but it is never latent. When the process has spread beyond the lymphatics, the prognosis is less favorable. An acute tuberculosis in apparently healthy children is generally merely the end of an occult process, and these processes should be combated by every means. In 8 children between three and eight months old, the tuberculous process apparently was arrested by the tuberculin in all but one, while the medication did not interfere with the development of the children. In one case the physical findings indicated an apical process; but the recovery under tuberculin showed that the process must have been restricted to the glands.

He advocates tuberculin treatment in all cases in which the lungs are not involved. There is also a chance for benefit if the lung process is small, with little tendency to progress; but progressive pulmonary tuberculosis contraindicates tuberculin and only discredits this method of treatment. The children thrive under the tuberculin. Fever does not necessarily preclude tuberculin treatment. Small doses may even banish the fever. Fifteen curves are appended to show the dosage and progress of some of the little patients less than a year old.

Neumann[1] says that it may be considered as proved that children can stand much higher doses of tuberculin than have previously been used. In a large number of children, the original sensitiveness to tuberculin was lost relatively quickly, and one had to inject larger doses in order to obtain perceptible results. In respect to the most effective method of using tuberculin, more experience must be collected, and for this purpose the significance and the course of the local puncture reaction must be more thoroughly studied than appears to have been done before.

The Technic of the Autotuberculin Treatment of Pulmonary Tuberculosis. Rothschild[2] lays down various rules for improving the technic of tuberculin treatment of pulmonary tuberculosis. The correct dose of tuberculin seems to be the smallest dose which causes a pronounced rise in the opsonin-content of the blood. The opsonic

(1) Deutsche med. Wochenschr., Jan. 27 and Feb. 3, 1910.
(2) Beiträge z. Klin. der Tuberk., 1909.

index is an exact guide for tuberculin treatment, but it sometimes gives contrary findings. It is possible to eliminate the causes for these discrepancies by using as the tuberculin an emulsion of tubercle bacilli derived from the patient's own sputum, urine, or any disease-product of the patient himself. The phagocytosis must be tested with the patient's own bacilli to insure absolutely reliable findings. The logical consequence is, that each patient should have his own individual tuberculin, a bacilli emulsion made with his own bacilli.

This autotuberculin is specific in the truest sense of the term, and the opsonic index conforms to it constantly. He has applied this autotuberculin in 3 cases, and was impressed with the superior curative results obtained with this form of tuberculin treatment. He never surpassed the dose of 1/500 mgr.; but each inoculation was followed by a brief negative phase of the opsonic index, succeeded by a pronounced and prolonged positive phase. When the opsonin-content of the serum begins to decline, another inoculation is made, the intervals ranging from two to four days. These small doses always displayed a distinct influence on the opsonic index, and induced marked improvement in the subjective and objective condition. He adds that in cases of mixed infection vaccines should be used against the other infectious germs to supplement the tuberculin treatment. For this also he recommends inoculation of killed cultures of germs cultivated from the sputum or pus of the patient in question.

Autotuberculin treatment under the control of the opsonic index promises to solve the question as to the dosage and intervals of the injections. Of course artificial inoculation of an emulsion of tubercle bacilli is necessary only when the opsonic index is too low. In certain cases of tuberculosis the opsonic index is very high, and he agrees with Wright that in these cases there is a continuous or constantly repeated auto-inoculation of the blood with bacilli and bacillary products from the vicinity of the focus. This keeps the opsonic index high. In all such cases artificial tuberculinization is purposeless. On the contrary every effort should be made to prevent too energetic autotuberculinization, protecting the patient by complete bed-rest or restriction of unnecessary movements.

If the bacillary toxins overwhelm the organism too much, the changes in the opsonic index are accompanied by severe subjective disturbances. The fever-curve has no direct relation to the opsonin-content of the blood, yet the maximal temperature after too large doses of tuberculin seems always to correspond with the lowest point of the negative phase of the opsonin curve following the inoculation.

In cases in which it is impossible to obtain any bacilli from the patients, he uses an emulsion of mixed bacilli, a universal tuberculin, which contains as many different kinds of acid-proof bacilli as possible, both the bovine and human types. This does not supply an absolutely specific autotuberculin, but comes nearer to it than of the ordinary preparations now in use. The simultaneous inoculation of a number of varieties enhances the probability that one of them is of the patient's own type.

The endogenous autotuberculin accumulated in the periphery of the disease focus can be forced into the blood by systematic graduated movements; and thus, by artificial means, the opsonin-content of the blood can be increased. In this way it is possible to utilize therapeutically the endogenous autotuberculinization by a rational succession of periods of rest and work. He applies the term exogenous autotuberculin to that produced outside of the body by an emulsion of the patient's own bacilli.

Combined Intravenous Tuberculin-Arsenic Treatment of Tuberculosis. Mendel[3] expatiates on the necessity of supplementing tuberculin treatment with some drug which will promote the vital energy of the cells by favoring nutrition and thus increasing the protecting and resisting power of the cells The combination has another advantage in that it utilizes the influence of the tuberculin in inducing an inflammatory reaction in the vicinity of the tuberculous focus. This local inflammation reaction attracts the injected drug to the spot, so that the arsenic, if this drug be selected which he strongly advises, accumulates in and around the tuberculous focus, stimulating the tissues at this point to extreme defensive and resisting action, and

(3) Muench. med. Wochenschr., Dec. 29, 1909.

thus raising an effectual wall around the tuberculous focus, preventing its further spread.

He has long been an advocate of the intravenous route for medication, and declares that it is particularly useful for injection of tuberculin, as the experience of many has confirmed the surprising way in which minimal doses of tuberculin injected into a vein stimulate the production of the protecting substances in the organism infected with tuberculosis. The tuberculin by its exciting influence on the local focus and the resulting inflammatory reaction in the vicinity, acts like the express wagon which carries the package to the point where it is needed and leaves it there, while the arsenic stimulates the local curative action and at the same time has a general tonic effect. The combined tuberculin-arsenic treatment thus fulfils all the conditions which Ehrlich demands for an ideal chemotherapy; the supply of the "distributive substance" (tuberculin), and of a "pharmacophor group" with a specific action (arsenic plus tuberculin).

Mendel has been applying this combined intravenous treatment for some time and has been much pleased with the results, not hesitating to declare that it offers the best chance for favorably influencing the tuberculous process, and that it should be introduced as a routine method for treatment of the somewhat advanced cases in the sanatoria, and also for the treatment of dispensary cases in the first and second stage.

UROTROPIN.

Urotropin in the General Treatment of Infectious Diseases, Especially Scarlet Fever. E. Grawitz states that in view of the important rôle which the kidneys play in combating infection, the prognosis becomes unfavorable when a nephritis hinders elimination of toxic products. The integrity of this most important excretory organ must be preserved. Therefore, prophylaxis with urotropin which acts as a mild disinfectant in the urinary passages, is very commendable, as his success in scarlatinal therapy shows. Furthermore, in septic infections of various origins this renal prophylaxis is entirely rational.

Small children with scarlatina are given 4 grains of

urotropin thrice daily on admission; older ones and adults receive 7 1/2 grs. thrice daily for four successive days. After a four days' interval, it is resumed for another four days, again withdrawn for the same period and a final four days' course given. Albuminuria on reception is no contra-indication; on the contrary it often disappears under urotropin.

During a period of over four years, in more than 500 cases, his success from this procedure has been so brilliant and unequivocal that he ascribes to it, in large part, the credit for his low mortality figures. In patients admitted with non-affected kidneys, he has seen but 5 to 6 per cent. of renal irritation and inflammation develop, and most of these were only transitory. Not one patient was left with a chronic nephritis. What is especially convincing, not one case of uremia was observed. Formerly, in the midst of apparent recovery, a hemorrhagic nephritis with chills and uremia would suddenly set in. This severe complication has not been seen at all in recent years. Even patients not admitted until the third day of the disease, with renal irritation, suffered extremely rarely the severe sequels of nephritis.

Urotropin in Cerebrospinal Meningitis. S. J. Crowe[4] reported a case of meningitis with a cerebrospinal fistula, in which a fatal out-come was looked for, and in which at Cushing's suggestion, urotropin in large doses was given in the hope of its cerebrospinal excretion. The patient recovered.

This led to further investigation by the writer, and it was found that the drug may possibly be absorbed as readily by the rectum as when given by the mouth. It has been the custom in the Johns Hopkins Hospital to administer urotropin promptly to all patients with lesions, which are not infrequently followed by meningeal infection; and the complete absence of such complication in quite an extensive series of cases seems to establish fairly well the prophylactic importance of the drug. This series included a number of compound fractures of the skull, gun-shot wounds of the head, and cerebrospinal fistulas, the patients receiving thirty to sixty grains of urotropin daily. It is used also prior to ventricular or lumbar puncture, when

(4) Johns Hopkins Hosp. Bull., April, 1909.

local conditions make possible the inoculation of the meninges with organisms from the affected skin. Urotropin should also be given before a first catheterization, or one done when urethral infection is present. Possibly, too, the drug may be used wisely in cases of extracranial infection when extension to the meninges is feared, as in infected scalp-wounds, otitis media, and suppuration of the cranial sinuses. Its use may be desirable also in elaborate spinal or cerebral operations. The author summarizes as follows:

1. Urotropin, given by the mouth, invariably appears in the cerebrospinal fluid. This fact has been demonstrated by a large number of observations on man, and is also true of dogs and rabbits.

2. The largest amount of urotropin is present in the cerebrospinal fluid from thirty to sixty minutes after ingestion of the drug.

3. After therapeutic doses, a sufficient amount of urotropin appears in the cerebrospinal fluid to exercise a decided inhibitory effect on the growth of organisms inoculated into this fluid after removal from the body.

4. Following a subdural inoculation of dogs and rabbits with streptococci, sixty to eighty grains of urotropin a day given under conditions which insure absorption, will markedly defer and in some cases prevent, the onset of a fatal meningitis.

5. The prompt administration of urotropin is advised in all clinical cases in which meningitis is a possible complication, or even when meningeal affection actually has occurred.

VACCINE THERAPY.

The Therapeutic Value of Stock Vaccines in the Treatment of Infections. The general principles underlying this mode of therapy are described by J. Williams,[5] who defines a vaccine as a killed bacterial culture suspended in normal saline solution to which $\frac{1}{4}$ per cent. lysol or $\frac{1}{2}$ per cent. carbolic acid has been added. Their injection into healthy individuals causes (1) an immediate rise in the protective substances as indicated by the opsonic index, (2) a fall of longer or

(5) Lancet, Sept. 26 and Oct. 3, 1908.

shorter duration, followed by a rise up to or above normal, with a succeeding fall to normal, and (3) a fall tending to be more or less permanent, according to small, medium or excessive dosage. The intelligent use of vaccines presupposes (1) diagnosis of the bacterium at fault, the isolation and culture and preparation of a vaccine, and (2) the estimation of the amount which for a given case constitutes a proper dose and the correct determination of the period which should elapse before inoculation. These points are elaborated in considerable detail. In the institution with which the author is connected it has been found practicable to dispense tubercle (T. R.), staphylococcic, streptococcic, gonococcic, and typhoid vaccines. The paper of Williams will serve as a valuable introduction to anyone wishing to take up the study of vaccine therapy.

Vaccine Therapy in Infection by the Acne Bacillus. A. Fleming[6] refers to the various micro-organisms found in the pustules of acne, and dwells especially on the bottle bacillus, so called from its shape. It presents an appearance very much like yeast. It occurs in the more superficial part of the comedo, and is found constantly in dry seborrheic conditions of the scalp. The bacillus is a pyogenic organism, as it is constantly present in the pus, is frequently the only organism there, can be recovered from the pus in pure culture, and when inoculated into the skin of susceptible individuals, produces a pustular folliculitis, while examination of the pus shows no other organisms present. Inoculated into animals, it produces a local abscess, from which the bacillus is recovered in pure culture. The serum of patients affected with acne agglutinates the bacillus in some cases. The opsonic index of patients to the acne bacillus varies considerably from normal. Large doses of a vaccine derived from the acne bacillus have induced a marked negative phase characterized by the appearance of fresh pustules from which the bacillus has been recovered in pure culture. A vaccine from this organism has a marked beneficial effect on the condition. When a patient has a marked high opsonic index to the bacillus, his condition improves; but, when the opsonic index is low, fresh pustules appear.

Vaccine Therapy in Colon Bacillus Infection of

(6) Lancet, Apr. 10, 1909.

Urinary Organs. Routh[7] reports the case of a woman, thirty years of age, who had suffered from the age of fourteen from chronic constipation and an irritable bladder with frequent micturition. For many years she had been unable to lie on the left side for any length of time, as that position always caused pain in the right loin sufficiently severe to awaken her if asleep. Her first child was born in 1902, the labor being normal. She had had no miscarriages, and again became pregnant in June, 1908. On January 2, 1909, she had a severe rigor, followed by acute pain in the right iliac region. This was followed on January 4 by vomiting. The symptoms did not abate, and when seen on January 6 she was evidently acutely ill; the temperature was 103° F.; the pulse was 120; there was constant vomiting and also great abdominal tenderness, especially over the appendix, and pain running from the ascending colon to beneath the liver. Micturition was frequent and painful, and there were severe rigors followed by profuse perspiration and great exhaustion. She was treated with urotropin, ten grains every four hours, aspirin at night when the pain was acute, and heat locally. On January 9, 1909, pus was found in the urine, which was acid and free from smell. It became evident that the trouble was due to some lesion in the right kidney.

Owing to the long history of pain in that organ in certain positions, and the history of irritable bladder, it was thought that some calculus might be present, or that the attack was a lighting up of some old infection. Examination of the urine showed a pure culture of *Bacillus coli,* and from this a vaccine was prepared. The opsonic index was 1.8. The first injection was given on January 12, and within six hours the temperature fell from 104° F. to normal, and the pulse, which had varied from 120 to 160, to 104. All other symptoms, with the exception of the rigors, remained, a very large amount of pus being passed daily. The urotropin was continued, small doses of morphin being given occasionally for the pain, which was still intense, and a purge each night. Five days after the injection the opsonic index was 2.5. From this date to January 24, the pulse never arose above 104, nor the temperature above 100° F., though all the other symptoms remained as acute

(7) Brit. Med. Jour., Jan. 22, 1910.

as before. On January 24, two rigors occurred, and the temperature rose to 102° F., only to fall to subnormal the next day, at which point it remained. The patient was kept in bed on light diet, and gradually increasing doses of vaccine were given every eighth day until six had been administered.

On February 28, a healthy female child was born, the labor being perfectly normal. The patient made an uninterrupted recovery, and three weeks later the urine was free from pus and *Bacilli coli*. Since then, she has been in good health.

Rovsing[8] states that he made a trial of Wright's vaccine technic in the treatment of colon bacillus nephritis and pyelitis, entering on it with much skepticism, but he has become convinced of the great value of this method of treatment. He relates the histories of 4 out of 12 patients thus treated, showing a prompt cure after failure of all other measure, and he urges others to try this technic in all cases rebellious to other methods of treatment. The reaction, both general and local, is surprisingly mild, and the local reaction might be reduced still more if the fluid was fractioned and injected at different points.

Vaccination does not seem to affect the proliferation of the bacilli in the urine, and consequently he advises as supplementary measures a retention catheter and irrigation of the bladder with 2 or 3 liters of distilled water, and 1 gm. (15 grains) of salol internally three times a day. The value of the vaccine treatment was especially evident in one case, the patient being a v-para of 65 with colon bacillus infection for a number of years and recurring acute nephritis. The last attack was septicemic, with coma and blindness in the right eye from thrombosis. Rovsing was convinced that the vaccine treatment was life-saving in this instance. The patient has had no signs of trouble during the six months since.

Vaccine Therapy in Erysipelas. The results of the use of a vaccine prepared from Fehleisen's *Streptococcus erysipelatis* are reported and discussed by G. W. Ross and W. J. Johnston.[9] They employed the vaccine in 50 cases of erysipelas, and from this experience they firmly believe

(8) Hospitalstidende, Copenhagen.
(9) Jour. Am. Med. Assoc., Mar. 6, 1909.

that when properly administered it exercises a specific and controlling influence on the course of the disease, preventing its spread, lessening its severity, and hastening recovery.

In the first 16 cases they followed the method of opsonic therapy, but the results were so satisfactory that in the remainder they felt justified in omitting the usual opsonic blood examinations; and they had equal success in the remaining cases, many of which were severe. They admit, however, that in certain severe cases the usual thorough blood examination may be required. It is unnecessary, they say, to prepare a vaccine for each case, but it is advisable to have a composite stock of vaccine from several different strains, and as many different cases; and it is probable that the more virulent the case of erysipelas the more valuable will its streptococcus be as a vaccine.

Their method in almost every case has been to inoculate with 10,000,000 of dead streptococci on the first visit if the case is a severe one, and with 20,000,000 if the case is less severe. On the second visit, in a severe case, the patient gets 10,000,000 if there be signs of improvement. The most important of these signs is a certain clearing of the intellect, and the next is the lessened tenderness and pain. The temperature is not so valuable a sign, though a fall of two or three degrees on the morning following the injection is a valuable indication for a second inoculation. If, however, no evidence of improvement follows in the severe case and it is impossible to determine the opsonic power of the blood, then 5,000,000 only should be given on the second day. In less severe cases improvement is almost always manifest on the day after inoculation, and the patient should receive but half the first dose; that is, 10,000,000. They then inoculate with 5,000,000, 10,000,000, or 20,000,000 of streptococci on every second day until a week after the temperature has reached normal, and the erythema has subsided. They are guided as to the dose in each case, when opsonic investigations are impossible or unnecessary, by its severity and the unsatisfactory results as shown by clinical observation. The rule is, "The more severe the case, and the less satisfactory the clinical response, the smaller the dose." The site of inoculation has always been chosen away from the involved area. They

have been so successful that they have not felt it necessary to attempt inoculation near the site of infection.

Nineteen cases observed by them in 1907 which were treated in the ordinary way, are tabulated and compared with an equal number treated in 1908 by inoculation, and the advantages of the later method in the way of shortening the duration of the disease, and the avoidance of complications, are very manifest.

Vaccine Therapy in Gonorrhea. N. E. Aronstam[1] finds that the gonococcic vaccine acts beneficially in acute cases of gonorrhea, and the time required to cure the disease does not exceed four weeks. It is also useful and may be considered curative in some of the complications, such as epididymitis, acute prostatitis, gonorrheal adenitis and enlargement of lymph channels on the dorsum penis. He has also used it lately with success in gonorrheal iritis. No other treatment, systemic or local, is necessary. In chronic cases it is inert and acts indifferently, owing to the mixed infection in these cases, and the conjoined use of other bacterial vaccines suggests itself.

It is a valuable diagnostic agent, bringing to light latent or dormant conditions and showing whether a given case has actually been cured, an especially important point for sociologic reasons. In dormant gonococcic arthritis it will bring about a recrudescence of the disease. It materially shortens the duration of this complication and brings about a speedy cure. No exact rule can be given as regards dosage and intervals of administration; each case must be treated individually. Aronstam considers that the future possibilities of gonococcic vaccine are unlimited. Its bearing on prophylaxis in the disease, which is to be recognized as a systemic and not a local infection, must be considered.

Vaccine Therapy in Pneumonia. The effects of vaccines in chronic pneumococcic infections, and the results of vaccine therapy in other diseases, show the necessity of investigating thoroughly the value of vaccine therapy in acute pneumonia. Latham's[2] work is encouraging. He describes several cases in which the patient's physique was good, and in which, in any event, a recovery appeared to be probable, in which the use of a pneumococcic vaccine

(1) Jour. Am. Med. Assoc., Oct. 24, 1909.
(2) Practitioner, October, 1909.

was co-incident with rapid improvement. In some of these instances the crisis has occurred on the second, third, or fourth day, apparently as the result of the vaccine, and recovery has been uneventful. But it has not been of service in severe attacks in debilitated or elderly people. There can be no question but that an excessive dose may lead to the spread of the disease to the other lung, or to the formation of an empyema.

A vaccine prepared from the patient's own strain acts better than a stock vaccine, but the preparation of the patient's own vaccine, although it may be done in twenty-four to forty-eight hours, is not always possible, and means some loss of valuable time. The dosage to employ remains to be worked out. The fact that very different results are obtained points to the varying potency of the stock vaccines on the market. The initial dose must be in accordance with the age and physique of the patient, the severity of the disease and its stage of development. It is rarely wise to give a larger initial dose than 10,000,000 bacilli. The result can be watched on the temperature record, and it is doubtful whether even frequent readings of the opsonic index give us any further information. If a dose is followed by a lowering of the temperature, it has done good. If the temperature then rises again, we may repeat the dose (or give a slightly larger one in some cases) at an interval of thirty-six to forty-eight hours from the first dose. If a dose is followed by a rise in the temperature, it has been too great. If a dose has no effect on the height or range of the temperature, or on the symptoms, we may give a larger one in thirty-six to forty-eight hours.

T. Leary,[3] believing that the data obtained from the treatment of cases of alcoholic pneumonia would at least be suggestive, appealed to several medical groups to test the value of vaccine on the alcoholic and extreme cases. Pneumococcus vaccine was furnished for the treatment of 24 patients of this type, of whom 6 died (17.7 per cent.). In a larger series of cases of ordinary pneumonia (49), 15 per cent. came to crisis in three days, and but 2 days were reported. The total deaths for the series of 83 cases were 8, or 9.7 per cent. It was noted by most observers that

(3) Boston Med. and Surg. Jour., Nov. 11, 1909.

rapid relief of toxemic conditions which were present in serious cases, followed the use of vaccine; and in cases of uncontrollable delirium, an abatement of the delirium was prompt. The results are encouraging enough, Leary believes, to justify the wider application of this treatment.

Craig[4] reports 6 cases of pneumonia which are of some importance on account of the age of the patients (sixty-six to eighty-three years); the marked alcoholic history, several of the cases developing at the end of an alcoholic debauch; the poor general condition of the patients, all but one having chronic nephritis, and all showing marked arteriosclerosis; and the marked contrast between the results of the vaccine treatment and the mortality from pneumonia at the Sailor's Snug Harbor Hospital in similar cases, previous to the treatment by vaccines. Nearly all the inmates of this institution are over sixty years of age, and the mortality from pneumonia, for the past four years, previous to the present method of treatment, was 66.3 per cent.

The present plan of treatment, as soon as the diagnosis is made, is to give the patient a hypodermic injection of killed pneumococci, 20,000,000 to 35,000,000 in number, of a vaccine left over from a previous case of pneumonia, and to prepare an autogenous vaccine from pneumococci isolated from his own sputum in their laboratory to carry on the treatment. The inoculations of the killed bacteria into the patient are repeated in from twenty-four to forty-eight hours, for one, two, or three doses, as found necessary, 20,000,000 being the minimum dose, and 50,000,000 the maximum. In addition to the use of the vaccine in these cases, the patients were treated symptomatically, being given stimulants, etc., when indicated. All 6 patients recovered.

After a study of 11 personal cases of pneumonia, A. B. Harris[5] says that clinically, death in this disease usually comes from cardiac failure, especially in those virulent cases terminating about the fourth day of the attack. In these conditions, the vaccine treatment in many instances will indeed reduce the fever, but fails to avert a fatal result. The toxemia already induced is too profound for

(4) Med. Record, Feb. 12, 1910.
(5) Brit. Med. Jour., June 26, 1909.

merely the arrest of the infecting process to be successful. Hence the vaccines should be used at the earliest possible moment, and be accompanied by the use of an antitoxin. It is not improbable that in the case of the pneumococcus the success of a vaccine is due not simply to the fact that it should be autogenous, but the fact of a vaccine being autogenous narrows down the issue to, first, the right organism being selected, and, secondly, the vaccine being prepared, if not unduly subcultured, from an organism of requisite virulence. Fraenkel's pneumococcus, however, as far as we know, is invariable. It is not like the streptococcus (Gordon), an inclusive term for several varieties. On the other hand, we know from experience with the staphylococcus and colon bacillus, that these may be so subcultured as to lose their original virulence, and that vaccines so prepared are of little use therapeutically. If, then, a potent and reliable stock pneumococcus vaccine is to be obtained, it should be made from as virulent a strain as possible. There is happily no difficulty in the early months of the year in obtaining as much as is wanted. The truth of this statement can be verified only by a great number of observations.

With regard to the treatment of acute pneumonia by inoculation, the practical conclusions, which alone can interest the busy clinician, are:

1. Successful inoculation for pneumonia is possible.
2. Inoculation does no harm.
3. A vaccine from one or a number of virulent strains should be used.
4. It should be introduced as early as possible.
5. The estimation of the opsonic index is not necessary.
6. The observation of the temperature and physical signs in pneumonia is a sufficient guide in gauging the repetition of the dose.

Infections of the lung by the pneumococcus which fail to resolve after an acute pneumonia, as well as pneumococcic infections of other areas, ought certainly to be treated with a pneumococcus vaccine; and these cases appear to afford a reasonable prospect of success.

Vaccine Therapy in Staphylococcic and Streptococcic Septicemia. Hartwell, Streeter, and Green[6] give an

(6) Surg., Gynec. and Obstet., September, 1909.

excellent summary of clinical experience with sepsis treated by vaccines from the laboratory of the Massachusetts General Hospital. They state that the study is taken up from the clinical point of view, and that success or failure seems to depend upon the condition of the case and the severity of the infection rather than upon the variety of the pathogenic organism. In every case the pathogenic organism was determined by culture, and in the majority an autogenous vaccine was used. In some, two different vaccines were employed, as, for example, where it seemed probable that there was more than one offending bacterium. The initial dose is from 5,000,000 to 25,000,000; and this amount is gradually increased at each successive inoculation, as tolerance is obtained. The maximum amount is usually 100,000,000. In all cases except general infections, an arbitrary interval of three days was made between each two inoculations; *i. e.*, they were given every fourth day. They seemed to afford the most satisfactory results in boils and carbuncles. In general infections, the vaccines are given more frequently, and the doses as a rule are smaller, as there seems to be a diminished tolerance for larger amounts.

The clinical symptoms were characterized by a rise in temperature following a drop after inoculation, this drop being an indication to re-inoculate. Occasionally the dosage was pushed, and reactions were seen. They consisted usually of slight headache and backache, accompanied in the more severe cases by nausea, sometimes by vomiting, with chills, and a rise in temperature of a degree or two. They followed several hours after inoculation, and disappeared in a few hours. These reactions were rare, and seemed to have no ultimate ill effects. They were taken as indications for a reduction in dose.

In some cases the evidence of the value of bacterial vaccines was clearly shown. In others they were apparently without avail. Eighteen cases of general infection of puerperal nature recovered. Of 9 general infections, 4 died. Vaccine therapy in this group was not given any greater share of credit in the successful cases than was given to the complete surgical treatment which was followed.

There were 22 cases of septic laparotomy wounds, all of which recovered, though not one of the group was danger-

ously sick. In 41 cases of local sepsis, partly involving the fingers and hand, autogenous vaccines were given up, excepting where the *Staphylococcus aureus* was found. All of these cases recovered, and the authors were unable to perceive any pronounced effect upon the local process as the result of their injections. Some few of the cases, in which the intensity of the sepsis had apparently run its course, and which were left with a smoldering process in which little progress had occurred, seemed to be stimulated by the vaccines to a speedy resolution.

Their conclusions are as follows: That bacterial vaccines should further be employed in puerperal infections which do not immediately respond to routine treatment; and that bacterial vaccines are of much value in that type of sepsis which has remained stationary for some time, as illustrated by a few septic laparotomy wounds and a certain number of cases of local sepsis.

G. A. Persson[7] has employed vaccine therapy in 68 cases. Of the *Streptococcus rheumaticus* cases, 32 were cured, 8 improved, and 7 unimproved; of *Staphylococcus pyogenes aureus* cases, 7 were improved, and 4 unimproved; of *Bacillus coli* cases, 1 was improved, and 3 were unimproved. The bacterial vaccine which was used in all these cases was prepared in the following manner: A desired micro-organism was grown in a medium consisting of eighty parts of sea water with a specific gravity of 10.15 which had been sterilized by filtration, and twenty parts of a 5 per cent. solution of neucleinic acid, allowed to develop in the incubator for forty-eight hours, when proper dilution with the sterilized sea water was made to form a suspension of 20,000,000 germs to the cc. It was then exposed to the thermal death-point for thirty minutes. Each patient received a daily inoculation of 1 cc. or 20,000,000 germs.

The author discusses the various theories of rheumatism. He believes that it is an infection, but adds that there is at present no general agreement as to the exact nature of the infection. Current theories include the specific bacillus theory, not yet absolutely confirmed; the septicemic theory, the disease being due to some staphylococcus or streptococcus; the diplococcus theory; and,

(7) N. Y. Med. Jour., Jan. 15, 1910.

lastly, that the disease is due to some unknown cause. The main arguments for and against each of these theories are summarized. The author does not stand committed to any one of these views. He says that a point well worthy of emphasis is the fact that immunity is to-day but an accidental condition produced by an unknown force at work in strange environments. When this force is harnessed by man's ingenuity, and with scientific guidance can be directed into the avenues of pathologic changes in the human body, this condition will no longer be accidental, but it will come within the power of the physician to wrap Nature's cloak of protection in gentle folds about the susceptible individual, and place his suffering patient upon that high level of physiologic perfection which today we call immunity.

VACCINES.

Vaccine Therapy in Tuberculosis. Germani[8] reviews the history of specific treatment and vaccination against tuberculosis and reports 10 cases in which predisposed persons, unusually exposed to tuberculous infection, were apparently saved by vaccination according to Maragliano's technic. This is the inoculation of the arm with a tuberculous vaccine to create a tuberculous abscess without living bacilli, and thus to activate the production of defensive antibodies. His experience has confirmed the harmlessness of the method and he urges its application, especially in industrial centers, as an important link in the chain of measures against the white plague.

L. Grant, T. H. Campbell and W. D. Anderson[1] record their personal experiences with 4 cases. Two were tuberculous, one presented staphylococcic infection and one, encapsulated pneumococci mixed with Friedländer's pneumococci. In the tuberculous cases, T. R. tuberculin was used, and in the other two the proper vaccine prepared *secundum artem*. Results were satisfactory in all 4 cases. In the cases treated with tuberculin the following facts are emphasized: 1. The scars resulting were soft,

(8) Gaz. degli Osped. e delle Clin., June 13, 1909.
(1) Lancet, Sept. 26 and Oct. 3, 1908.

pliable and the disfigurement (following certain operative procedures) slight. 2. Recovery under the treatment seemed rapid, and this implied the saving of suffering and expense to the patient and anxiety to the medical attendants. 3. The absence of severe surgical measures minimized the risk of a general tuberculous infection and obviated that slight risk which always attends general anesthesia. 4. Although opsonic estimations were made only occasionally during the treatment, they suggested that the index was being steadily raised; and from this it is probable that for some time, at least, the patients will be less susceptible to attacks by the same bacterium. Surgical measures alone may achieve this indirectly, inasmuch as they rid the body of the focus of the disease, but it is questionable if they are capable of raising the standard of defense to the same high level as that induced by vaccine therapy.

Vaccine Therapy in Tuberculosis of the Joints. Edward H. Ochsner[2] declares that vaccine therapy in tuberculosis of the joints has a threefold effect. First, it reduces the mortality; secondly, it hastens convalescence; and, thirdly, it improves the ultimate functional results. He believes that if patients with joint tuberculosis come to the surgeon sufficiently early, if they are placed under proper hygienic conditions, if suitable measures are adopted for the prevention of secondary infection, if the joints are immobolized perfectly for a sufficient length of time, and if vaccine therapy is instituted under control of the opsonic index, the great majority of cases will secure perfect or nearly perfect functional and anatomic results. Up to a few years ago, we were very well satisfied if we were able to bring a case of simple tubercular arthritis to a successful healing of the tubercular process without surgical intervention, and we were quite satisfied if we accomplished this result with ankylosis, providing the limb was ankylosed in a useful position. A larger joint with mixed infection sometimes resulted in the death of the patient, often in the loss of the limb, and very commonly in persisting sinuses. But now we can always practically save the life and limb of such a patient, and sometimes even secure a useful joint. In tuberculous

(2) Ill. Med. Jour., July, 1908.

joints uncomplicated with mixed infection, we can, if the patients come to us sufficiently early, secure perfect functional and anatomic results in the great majority of cases.

Vaccine Therapy in Typhoid Fever. Watters and Eaton[3] report a series of cases of typhoid fever treated by the hypodermic administration of vaccines made from dead bacilli. The patients were a mother and three children, all attacked at the same time and infected from another boy, who also came to the hospital. Typhoid fever was demonstrated clearly in all the cases by the Widal reaction, leucopenia, lymphocytosis, and roseolæ. Vaccines were used on all but the youngest child who was only slightly ill. The mother and the two children who received vaccines showed immediate abatement of clinical manifestations, and in the children a rapid fall in temperature. The youngest child, however, who was not inoculated, became steadily worse, till on the fourteenth day of the disease the temperature was 104.8° F. It fell immediately, with abatement of clinical symptoms, on the administration of vaccines. From an observation of 40 cases the authors suggest that the early administration of typhoid vaccine seems able in many cases to shorten materially the duration of the disease, or to improve the symptoms and cause it to run a mild course.

X-RAY.

The Therapeutic Action of the X-Ray. Fischer[4] discusses the local action of the rays on the skin and internal organs, and their property of inhibiting growth. Experience has demonstrated that the rays act first and predominantly on the spleen, lymph glands, and bone-marrow, and on the epithelium of the testicles, ovaries, and skin, but that no tissue escapes their influence. It is only a question of greater or less resistance on the part of the different tissues. The intensity of the reaction depends entirely on the amount of radio-units absorbed. The cell elements are the point of attack, and the reaction is strongest at the points where cell multiplication is proceeding most actively. The younger the cell, the

(3) Boston Med. and Surg. Jour., Apr. 22, 1909.
(4) Ugeskrift f. Leger, Nov. 19, 1908.

greater the influence of the rays. The reaction may be so intense that mitosis is arrested.

Effect of Reduction of Metabolism in the Action of the X-Ray. G. Schwarz[5] noticed that dry seeds are not affected by exposures to Roentgen rays, and germinated afterward apparently unmodified. Seeds beginning to germinate, however, were rapidly and seriously modified by even slight exposures. This connection between quiescent and active metabolism and the sensitiveness to the action of the Roentgen rays suggested that if metabolism in part could be artificially reduced the region would be desensitized, to borrow a term from photography. He here describes experiments in this line which confirm his assumption that the reduction of the metabolic processes in human tissues reduces the sensibility to Roentgen and radium exposures. He gives an illustration of one experiment: A girl of 11 being treated for nevus of the forearm had two square radium capsules applied, one lying loose on the arm, the other strapped down so tight that it compressed the skin and expelled the blood, thus checking the metabolism. The dermatitis under the loose capsule was marked and required two weeks for complete subsidence, while under the compressing capsule there was only transient, slight hyperemia. The same effect was obtained with Roentgen exposures of two square spots on the side of the head, one compressed and the other not. The hair dropped out of the non-compressed square, while the compressed square patch showed no effect from the Roentgen exposures. He does not venture to decide what technic is best for the purpose of checking the metabolism: mechanical pressure, elastic traction, compressed air, congelation or a chemical. He is now experimenting with each and is confident that this desensitization will aid materially in Roentgen and radium treatment both of the skin and of deeper regions.

The Therapeutic Value of the X-Ray. Müller[6] says that the advantages of *x*-rays in therapeutics are twofold. In the first place, they are especially promising in their action in the case of some otherwise incurable diseases and very disfiguring skin affections; and, on the other hand,

(5) Muench. med. Wochenschr., June 15, 1909.
(6) Berlin. klin. Wochenschr., Jan. 25, 1909.

their application is accompanied with no pain and extremely little discomfort to the patient. The rays are selective in their action, their effect upon the healthy skin in correct application being limited to the increase of the pigment in the deeper layers. In pathologic conditions, the rays lead to thrombosis of the smaller capillaries, to degenerations of the abnormal cells and of the endothelium of the blood-vessels, and to the gradual diminution of the diseased tissues by interfering with their nutrition.

Among the diseases most favorably affected by the rays is sycosis, both simple and parasitic. Müller does not remember a single case of this affection that was not cured, or at least very markedly improved, by the rays. Folliculitis, acne vulgaris, favus, trichophytosis, hypertrichosis, eczema, lupus, rodent ulcer, and, finally, some superficial malignant tumors, are open to the influence of the rays. Still more important are the results obtained in the treatment of blood diseases such as leukemia, as well as in the obscure group gathered under the name pseudoleukemia, which are very obstinate under any treatment, and many cases of which show improvement as soon as the *x*-rays are used. Final cures have not been obtained, however, in these conditions by any means at our command.

A. L. Gray[7] reviews the history of the therapeutic use of the *x*-rays, showing how this use has been modified with our better knowledge of the agent and the conditions to which it can be applied. We have learned that the pathologic conditions involving the epithelial structures can be influenced by the *x*-rays when sufficiently superficial to be reached by those which are active. Fibrous growths and lesions in which fibrous tissue involvement is largely present are affected very slightly unless the treatment is pushed to the point of actual burning or cautery. He believes that a satisfactory unit of quantity by which the *x*-ray can be measured will soon be obtained. Every apparatus is a law unto itself, and there is no fixed rule that applies to all; but an operator can so study his instrument as to learn to a large extent its therapeutic capacities. From the facts now known, he deduces the following conclusions:

(7) Jour. Am. Med. Assoc., May 1, 1909.

1. Malignant disease, while yet local, may be treated with the assurance of good results, provided the lesion is on the skin or very near the surface, and the age of the patient or condition of the general health is not such as to render the reparative powers too low. The treatment of deep-seated primary cancers should never be undertaken except in inoperable cases, or when the patient will not consent to surgical procedure. In these cases it is best to remove the diseased parts as radically as possible, leave the wound open to be treated by the Roentgen method, and if necessary resort to a second plastic operation to close it.

2. Such skin diseases as involve the epithelial and glandular structures are more or less amenable to treatment. Those involving the fibrous tissue of the corium respond with great difficulty or not at all.

3. Glandular enlargements, so long as they are due to gland-cell hyperplasia, will be benefited greatly by *x*-ray treatment. When the hyperplasia involves the connective tissue element, very little result will ensue.

The Dangers and Abuses of the X-Ray. Gottheil[8] gives a good resumé of the uses, dangers, and abuses of the *x*-ray. The *x*-ray is a remedy of positive though strictly limited value in dermatology. It is to be used with caution, since its dosage is unmeasurable, the individual reaction to it is unknowable, and its results uncertain in any given case. It should be employed only in the most serious dermatoses in any case, and in these only when it is entirely certain that safer and simpler means of cure are ineffective. It is not suited for use by the general practitioner, but only by those whose familiarity with it and with dermatology as a whole is a guarantee of certainty of diagnosis and of the observance of all the cares and precautions prescribed by experience.

The *x*-ray should not be used in the treatment of eczema, psoriasis, acne, alopecia areata, alopecia prematura, pruritus, hypertrichosis, folliculitis, ordinary ringworm, favus, etc., all of these being maladies for which we possess other efficacious therapeutic measures. In lupus erythematosus it is conceded to be useless. Epithelioma and rodent ulcer, except when so far advanced or so situated as to be unsuited for caustics, the curette, or the knife are

(8) Jour. Am. Med. Assoc., Nov. 21, 1908.

also to be excluded from the list. It may be used in lupus vulgaris, though it is not the only method of cure in many cases; in scrofuloderma, on account of the tediousness and uncertain results of other medication; in very extensive cases of ringworm of the head and beard for the same reasons. The *x*-ray is the treatment of election in epithelioma and rodent ulcer so situated that other methods of treatment can not be employed, or so extensive that other methods are hopeless, and in relapses after other methods; in tuberculosis cutis, erythema induratum, and some other tuberculides; in sarcoma, mycosis fungoides, rhinoscleroma, keloid, and acne keloid, in which diseases no other method has given as good results.

X-Ray Dermatitis. J. F. Han-Edwards,[9] a sufferer from this affection, gives a full account of his own case. The hands were particularly affected and their condition is shown by radiographs. It is interesting to note that the phlangeal bones became involved and that amputation of one forefinger was necessary. The ideal method of protection, says the author, must be one which so cuts off the rays that they emanate only from an opening representing a portion of the surface of the tube, and which is entirely under the control of the operator. He prefers to inclose his tubes in globes of thick lead glass and uses a Dean's shield. He also advocates the use of screens composed of wood covered with thin sheet lead, containing a window of lead glass of sufficient size to allow the operator to watch the patient during the exposure. He prefers to use the fluorescent screen as little as possible.

In one of the first communications given to us in the early days of the *x*-rays it was pointed out that the interposition of an earthed aluminum plate placed between the *x*-ray tube and the operator or patient rendered the effect of the rays upon the skin inert. At the same time there existed some difference of opinion as to how far the rays, thus cut off, influenced treatment. There can be little doubt that the electrostatic field which surrounds an *x*-ray tube in action has considerable influence in the production of radiodermatitis. That this electrostatic field is diminished by earthing the anode pole is certain, and the

(9) Brit. Med. Jour., Sept. 12 and 26, 1908.

author feels convinced that extra safety is secured by the earthing of all metallic conductors in this field.

The first shields devised were made upon unscientific lines, and for this reason, while they protected the operator, they failed to bring about satisfactory therapeutic results. Belot's shield was the first constructed upon sound lines, and it paved the way for the introduction of many pieces of apparatus which are more or less efficient. The author is convinced that the shield or protecting box for cutting off all rays from the tube, except those which are actually required for the purpose of diagnosis or treatment, offers the best method of protection, and he would advise every worker to adopt it. The position of the operator in relation to the tube is one of importance, and it should always be borne in mind that the safest place is behind the anticathode.

Roentgen-Therapy in Dermatology. Russel H. Boggs[1] claims, that, thoroughly tested and fixed on a scientific and rational basis, the *x*-ray had vindicated itself as an essential therapeutic adjunct in dermatology. Yet he thinks there is considerable difference of opinion as to the exact range of its usefulness. This is explained by the varying technic employed, which often is prescribed without the slightest appreciation of the widely different effects, physiologic and pathologic, that may be produced by variations in method and dosage; that one operator insists on the exclusive use of the soft tube, while another finds benefit only from a hard tube. Some urge the single massive dose as the most effective one, while others regard the repeated, gradually ascending dose as the only one permissible. Equally varied is the opinion as to the proper distance of the tube and the requisite time of exposure.

As the small and large doses often produce an opposite effect, as in ordinary medical therapeutics, so does the quality of the rays vary with the tube and current almost as much as one drug varies from another. Finally he says that no disease or condition can always and invariably be benefited by the indiscriminate use of the *x*-rays.

The author emphasizes the fact that no dabbler in science, no empiric, no narrow skeptic, can meet with anything more than an occasional and accidental result. The

(1) Archiv. Roentgen Ray, November, 1909.

successful therapeutist must first of all master his technic. After acquiring the ability to produce the desired quantity and quality of rays, he must then use them with the same precision, confidence and courage as he would in any other method of treatment. He should acquire an exact knowledge of physiologic, therapeutic, and toxicologic effects. Beyond this, he must have a profound understanding of the laws of pathology pertaining to skin diseases.

The author mentions the effect of *x*-rays on living tissues, that the reaction varies from a simple transient erythema to a deep-seated inflammation with sloughing, thus producing all the stages of a burn. Epilation is often an early result of radiation, and occasionally occurs on the scalp without any other evidence of reaction. The shedding of hair, however, usually is preceded by erythema. The hair begins to grow again in about six weeks, and is complete in from three to four months. In removing hair from the face, it is nearly always necessary to produce more marked reaction, which is followed by more or less pigmentation and occasionally by atrophy of the cutaneous tissue.

The author speaks of the different stages of reaction, even to ulceration. He explains how the same dose of *x*-rays affects different tissues differently; how a chain of lymphatic glands may undergo fibrous degeneration and obliteration without the *x*-rays exercising any serious influence on the surrounding structures. The most highly differentiated structures of the skin, such as the hair follicles, glands and nails, are more readily and more severely influenced by the rays than the less highly differentiated epidermic cells and the fibrous stroma. The cellular elements of the skin are the first influenced, and undergo a slow process of degeneration, whilst the connective tissue, the elastic tissue, the muscles and cartilage are affected but slightly. When the process of degeneration has reached a certain degree of intensity, an inflammatory reaction appears, which is manifested by a marked dilatation of the vessels and migration of leucocytes. When a considerable degree of cellular degeneration occurs, as a result of intense radiation, collections of leucocytes press into the mass of degenerated cells and further aid in the destruc-

tion of the injured tissue. He mentions the fact that pathologic cells are less resistant to the rays than are normal cells. Thus diseased cells may be destroyed by the rays, while at the same time the growth of the surrounding healthy tissue may be stimulated. He classifies skin diseases according to their reaction to *x*-rays.

1. Temporary or permanent atrophy of the appendages of the skin, as in the removal of the hairs, either permanently, as in hypertrichosis, or temporarily, as in sycosis, favus, tinea tonsurans, or tinea barbæ. The amount of radiation determines whether a temporary or a permanent alopecia is produced. The rays have been found exceedingly useful for producing a slight atrophy or diminution in size or functional activity of the subaceous glands, in acne, acne rosacea, lupus erythema, psoriasis and seborrhea, and for decreasing the activity of the several glands in hyperidrosis.

2. Destruction of microbes in living tissue, lupus vulgaris, etc. Since rays are not bactericidal, it has been suggested that the results in this class of cases are produced by the destruction of tissue of low resistance, thus rendering the soil barren.

3. Alterations of metabolism, both general and local, possibly account for the results in indurated eczema, lichen planus, psoriasis, or other indurated inflammatory skin diseases, where stimulation may cause absorption of its inflammatory products.

4. Destruction of certain pathologic formations, such as carcinoma, sarcoma, tuberculosis, and keloid.

5. Analgesic action on pruritus and on pain of malignant tumors and neuralgias.

Thus the author gives us a wide field for the application of the *x*-rays in dermatology, either alone or in conjunction with other treatment. In some disorders, more than one action of the rays may be indicated. He goes into the matter of dosage, length of exposure, distance of anode from the surface, vacuum of the tube, the amount of current passing through the tube, and the frequency of application.

For most skin lesions he uses a low vacuum tube, ranging between Nos. 3 and 4 on Walter's scale; and, in order to keep the vacuum low, he uses only one milliampére of

current. The anode of the tube is placed 10 inches from the surface to be treated. With the light described above, the time of exposure and number of treatments are varied in order to obtain the desired physiologic action. Five minutes three times a week will not cause a noticeable reaction, but will often produce an efficient therapeutic result after the treatment.

Doses of ten minutes three times a week are given when a mild reaction is desired, which usually is produced in from nine to twelve treatments. An exposure of twenty minutes three times a week will usually produce a dermatitis with a small amount of vesiculation, after ten to twenty exposures.

The author claims that the results of the Roentgen treatment in acne are superior to those obtained by any other method of treatment. He thinks that only the obstinate cases should be treated in this manner; that each case should be studied carefully, and all possible causes considered and remedied. He says that "the Roentgen rays appear to act upon acne in two different ways—by causing atrophy of the sebaceous glands, and by setting up an irritative desquamation." He believes that it requires more experience and judgment to produce uniformly good results in acne than in any other skin disease treated by the Roentgen rays. He speaks also of the successful treatment of chronic eczema, sycosis vulgaris, psoriasis, epithelioma, lupus, and keloid.

The X-Ray in Seborrhea Oleosa. Schmidt[2] finds the results of *x*-ray treatment to be equally good in seborrhea oleosa as in chronic eczema, lichen simplex chronicus (Vidal), lichen ruber verrucosus, and psoriasis. As both the sebaceous follicles and the sweat glands are apparently more sensitive to the *x*-rays than the hair follicles, no injury of the skin in the form of atrophy or teleangiectasis is to be feared, even when weak irradiations are rendered necessary by a recurrence.

The X-Ray in Ringworm. Dermatologists are agreed, says the *Lancet*[3] that no antiseptic can be made to penetrate into the depth of the hair follicle, and that all efficient modes of treatment of ringworm of the head act

(2) Berlin. klin. Wochenschr., July 20, 1908.
(3) May 15, 1909.

by exciting an inflammation of the follicle, by which the hair and its contained spores are extruded,, and a new, unaffected hair is formed subsequently. Until recently, however, no entirely satisfactory method was known of producing this ejection of all diseased hairs.

But soon after the discovery of the Roentgen rays it was found that the rays had the power of causing a temporary loss of hair, and when they were employed in ringworm it was found that in certain cases the new hairs which grew after the throwing-out of the old hairs were quite free from the disease.

Investigation has shown that the *x*-rays have no bactericidal power, and therefore have no direct action on the fungus of ringworm. They merely cause a rapid and complete epilation of all the hairs, whether diseased or healthy, of the part exposed to their influence. The success obtained in some cases stimulated the application of this method to a large number of children affected with the disease, but the results were uncertain. In many cases the remedy was applied inadequately, so that the epilation was imperfect and some diseased areas were left. In other cases the application was excessive, and a dermatitis of greater or less severity was caused. These occasional undesirable effects increased the caution with which the rays were applied, with the result that the proportion of cases increased in which a complete cure was not produced. The method employed consisted in giving many exposures, each of a few minutes' duration, and at intervals of a few days. In this way the dose of *x*-rays administered was rarely sufficient to cause complete epilation, with the result that some diseased hairs were almost always left.

This condition of affairs continued until Sabouraud published his method. It was Sabouraud who first had demonstrated clearly the plurality of the fungi giving rise to ringworm, and by his method of treatment he now has revolutionized the therapy of ringworm. The desideratum was an accurate method of measuring the power of the *x-rays.* To define the ampérage of the primary current was something. To define the volume of the secondary current was of still more value. The distance of the lamp from the patient's head was also of vital importance. But even when attention was paid to all these factors, the re-

sults were still not uniform. Sabouraud employed a method long used by photographers in estimating the actinic value of light. He had a pastille made composed of a substance which darkened on exposure to the *x*-rays. He found the amount of exposure required for complete epilation, and defined the tint attained by the pastilles during that exposure, thereby at once placing the treatment on definite lines. The child's head is exposed to the rays until the pastille has reached the tint of a card surrounding it. The rays then are stopped. The time required varies from fifteen to twenty minutes, and the single exposure is sufficient. In two or three weeks the hair falls out, and in a few weeks more the new hair begins to appear, quite free from the fungus.

At the *Hôpital Saint Louis* the method practically has replaced all other treatment, and in England it is being employed extensively. At several of the general hospitals it is used, and especially worthy of mention is the fact that it is employed at the ringworm schools of the Metropolitan Asylum Board. Here, under the care of T. Colcott Fox, a large number of children suffering from ringworm have been treated successfully by this method. Up to the present time, some 1500 have undergone the treatment with the result that the stay of each child in the school has been shortened greatly, so that it has been possible to close completely one ringworm school and also a block of the other school. The average time taken to cure a case has been reduced from eighteen months to three months and a half. In the ringworm school in Paris, the cost per child has been reduced from 2000 francs to 260 francs, that is to say, to almost one-eighth part of the former cost. It is thus a means of great saving, not only in the cost of treatment, but in the time during which the child is unable to associate with healthy children.

The same method is applicable to favus, and this is of importance, for the free admission of diseased aliens is bringing in yearly large numbers suffering from this disease, which is especially prevalent among Polish and Russian Jews. The London County Council is proposing to introduce the *x*-ray treatment of ringworm, and all who are competent to decide the question from a practical knowledge of the subject are agreed that it is by far the best

method of treatment with which at present we are acquainted.

The question naturally arises, Is the *x*-ray treatment of ringworm entirely free from risk? Is it not possible, that, eminently successful though it may be in removing the disease, it may produce harmful effects which may manifest themselves later? The public imagination has been stirred in this direction by a communication to the *Times*, in which the fear is expressed that the delicate brain of the child may be damaged by the *x*-rays, so that even though no harmful effects may appear at the time, the rays may so impair the cerebral tissue that its growth will be affected mischievously and its development checked or even rendered impossible. Those who would maintain such views point to the *x*-ray burns and the malignant growths which have appeared in those who have been exposed much to the *x*-rays.

The *Lancet* is fortunate to be able to print two papers bearing on the question of the *x*-ray treatment of tinea, one by J. M. H. Macleod, and the other by H. G. Adamson; and they are based on an extensive personal knowledge of this method of dealing with ringworm. The essential principle of the modern method is the accurate adjustment of the dose of *x*-rays, so that the desired effect, the removal of the hairs of the area treated, shall be produced with unfailing certainty, but so that no excess of rays can be administered. In this way the dermatologist can be certain of not producing any permanent alopecia of the scalp, and of not causing any *x*-ray burn. The only reaction produced is a transient erythema which disappears even before the hairs have fallen from their follicles. It is clear that care and skill are required to produce the beneficial, and only the beneficial, results; and at first occasionally the reaction was excessive, sometimes apparently from the use of incorrect pastilles, but these undesirable effects do not appear now, and the skilled operator can guarantee the thoroughness and innocuousness of the treatment.

With regard to the harm that it is suggested may be done to the growing brain of children, what evidence have we that any such harmful effect ever is produced? The only answer that can be given is that there is not a tittle

of evidence that the *x*-rays in small doses, such as those administered for epilation in ringworm, ever have had the faintest ill effect on the brain of the child.

Deep Action of the X-Ray in Tuberculosis. Wilms[4] reports a case of the treatment of laryngeal tuberculosis with deep *x*-ray exposures, which confirms the effectual action in such cases, as he has demonstrated already for tuberculosis of bones and joints. During the eighteen months he has found this treatment all that was necessary for tuberculous processes in the fingers, hand, elbow, foot, and ankle, in adults, dispensing entirely with curetting and resections. Tuberculosis of tendon sheaths in elderly persons reacts promptly to deep exposures. The deep action is obtained by the interposition of aluminum. He excludes children from this treatment if there is a possibility of injury of the epiphyses. As a rule, he gives one full Sabouraud dose, the sitting being an hour long, repeated every three weeks. In the case of laryngeal tuberculosis reported, the lesion healed completely after two sittings.

The X-Ray in Lupus Vulgaris. Tompkinson[5] advocates a method of treatment of lupus vulgaris of the face, which he claims is effective and gives good cosmetic results. He begins by removing the crust with salicylic ointment. In a few days he directs *x*-rays on part of the surface daily for five minutes. After three or four exposures, embracing the entire surface in divided doses, the whole surface is plastered with Unna's 50 per cent. salicylic acid and creosote plaster, renewed daily, after previously swabbing the surface with cocain solution if necessary to relieve pain. In ten days much of the tuberculous tissue will have come away. The lesion is then swabbed with cocain and dried and painted with a solution composed of phenol 50 cc., lactic acid 15 cc., salicylic acid 15 cc., and absolute alcohol 20 cc., mixed and well shaken. A few minutes later apply the following: Phenol 80 parts, and alcohol dilute 20 parts. After thus cauterizing, the surface should be dressed for a day or two with sterilized lint and carbolized oil (1 to 30), and thereafter with a 20 per cent. aqueous solution of ichthyol until healing has taken place. After healing

(4) Deutsche med. Wochenschr., Feb. 10, 1910.
(5) Practitioner.

has followed, the *x*-ray is advised for a few days, with short exposures of four or five minutes.

The X-Ray in Tuberculous Peritonitis. Allaria and Rovère[6] have had experience with 7 cases of tuberculous peritonitis and their conclusions are that the Roentgen treatment should be restricted to the form with ascites and that it must be suspended at the slightest sign of intoxication or aggravation. Owing to the difficulty of detecting these signs, the method should be regarded as still in the experimental stage. Their experience on the whole was unfavorable.

The Deep Action of the X-Ray in Malignant Diseases. Pfahler[7] discusses the value of the Roentgen-ray treatment in cases of deep-seated malignant disease in contradistinction to the epitheliomata and superficial carcinomata. Personal observations were made in the treatment of 35 sarcomata and 304 deep-seated carcinomata, involving the subcutaneous, glandular, visceral, or osseus tissues. Most of the cases were recurrent, very advanced, or very malignant, and such as had passed beyond the reach of other methods of treatment.

Although the Roentgen rays were used as a last resort, and ultimately failed in the majority of cases, some lives were saved, or were much prolonged, while in nearly all there was some temporary benefit. Of the 35 cases of sarcoma, 9, still under treatment, have improved markedly, while 65 per cent. of the remainder recovered, with a recurrence in 2. In operable cases, the best results will attend an operation immediately followed by a thorough course of Roentgen-ray treatment.

The treatment of carcinoma is not so satisfactory, though improvement was noted, and probably the greatest field of usefulness of the Roentgen rays is supplementary to operation both before and after: and after operation treatment should be commenced within a week, approximately fifteen to twenty treatments being given. Exposures should be from ten to thirty minutes: and, when over ten minutes, they should be given in more than one direction, though always toward the center of the growth. The distance of the anode from the skin should be from ten to fifteen

(6) Archiv. de Méd. des Enfants, May, 1909.
(7) Am. Jour. Med. Sciences, April, 1909.

inches; and the deeper the lesion, the greater the distance and the longer the exposure. In rapidly growing sarcomata, treatment should be daily, while in carcinomata three times a week may be sufficient; and this may have to be continued from a few months to several years, with varying intervals, depending on the patient's condition. Localized recurrent carcinoma usually yields to treatment unless the mucous membrane is involved.

The X-Ray in Epithelioma. Pfahler[8] observes that early superficial epitheliomata involving the skin of the face and the back of the hands, when treated early by means of Roentgen rays, should give good results in practically all cases. These results are brought about painlessly, with the least possible scarring and often with none, and they are probably more likely to be permanent than the results from treatment by any other method. Epitheliomata associated with senile keratoses yield to Roentgen rays rather easily, but there is more likelihood of recurrence. Deep ulcerating epitheliomata with indurated fibrous bases do not yield good results under this treatment and should be excised when possible. When this is not possible the rays will often give relief of pain, lessen discharge and prolong life. Epitheliomata involving the mucous membrane of the lower lip and cheek should be excised, and the excision followed by treatment of the glandular area with the Roentgen rays.

Iredell[9] observes that in superficial forms of malignant disease *x*-rays may tempororily arrest the course of the disease, relieve the pain, diminish the discharge, and heal up the ulcers. Probably *x*-rays prevent the occurrence of superficial secondary deposits. Embryonic cells are destroyed more easily by *x*-rays than are normal cells.

The X-Ray in Myomata. Schindler[1] reports 12 cases of myomata treated by the *x*-ray. In no case did the treatment cause increased bleeding. The author considers that in the *x*-ray we have a most valuable means of treating myomata, far superior to all other known methods except operation, and that frequently *x*-ray treatment spares the patient the hardships and dangers of operation.

The X-Ray in Leukemia. A. Stengel and H. K. Pan-

(8) Jour. Am. Med. Assoc., Nov. 21, 1908.
(9) Lancet, July 17, 1909.
(1) Deutsche med. Wochenschr., Mar. 3 and 10, 1910.

coast[2] advocate the use of a new method of treating leukemia by the *x*-ray, applying the radiation to the bone-marrow instead of to the spleen as has hitherto been the practice. According to the majority of pathologists it is the bone-marrow that is primarily involved in the lienomedullary or mixed forms, and recent researches have developed evidence that this is true also in lymphatic leukemia. The unsatisfactory results of *x*-ray treatment as hitherto given with its only 8.7 per cent. of ultimate cures is noticed, and the probable reason, *viz.*, that the *x*-ray treatment has been directed against a result instead of against the cause or seat of the disease, is pointed out. The rapid destruction of lymphoid tissue, such as is apt to follow direct splenic exposures, is moreover not always wise or safe, because a toxemia is easily induced thereby which has even caused death in some cases. Five patients have been treated by the new method with encouraging clinical results.

The technic of the treatment is described in detail; the length of exposures, their frequency, the avoidance of any production of toxemia, the points of application, etc., are all discussed. They find that the enlarged spleen is reduced in size, just as it is with direct applications, though more slowly, and the misleading tendency of a comparatively quick symptomatic cure is avoided. The patient's general condition is on the whole better from the start with this method, and toxemia can be avoided. The treatment must be systematic; cessation of it for long intervals is to be guarded against especially in the early stages, and even short interruptions are not advisable until the disease is well under control. The proper time to stop treatment is undecided, but usually not until the conditions are normal, and it is wiser to stop gradually rather than at once.

Lymphatic cases respond well to this method but it is advisable to observe the same precautions in regard to applications to the glands as to the spleen, *viz.*, not to expose them directly to the *x*-rays until considerably reduced in size and the patient's general condition has greatly improved and then with caution. Exposures are distributed almost all over the body, and the risk of severe dermatitis is with ordinary care very slight. The bone pains of splenomedul-

(2) Jour. Am. Med. Assoc., Apr. 25, 1908.

lary leukemia are early relieved by this treatment. The leucocyte count is found by the authors to be of comparatively slight importance *per se,* but the differential count is one of the important indices to the effect of the treatment.

Elischer and Engel,[3] discussing the Roentgen-ray treatment of blood diseases, report from Koranyi's clinic 44 cases of leukemia, lymphosarcoma, and mediastinal tumors treated with the Roentgen rays since 1904, and they discuss these experiences in detail. It is especially important that this treatment should be applied in the early stages. Later, much more intensive treatment becomes necessary, with all its inherent dangers. They advise radiotherapy for all tumors in the mediastinum, and all phenomena suggesting lymphomatosis and leukemia. They remark that it is impossible to foretell whether enlarged lymph glands in the neck will develop into a simple lymphoma, pseudoleukemia, lymphosarcoma, or tuberculous process; but, as the Roentgen rays have a beneficial action in all these conditions, they advise early and vigorous Roentgen treatment without waiting for differentiation. In the early stages of cervical glandular processes and mediastinal tumors, there need be no fear of destroying large masses of tissue with attendant intoxication, and consequently the treatment can be pushed with great energy. For ten or fourteen days they advise strong daily exposures for eight or ten minutes. Then the exposures are suspended while the patient's sensitiveness to the rays is determined, and the appearance of by-effects awaited. After this period of observation, the treatment is continued until signs of improvement or of the inefficacy of the measure become evident. They keep up the exposures for two or three months in case of a mediastinal tumor. If good results are not obtained with ten-minute exposures, the patient's susceptibility to the rays is so slight that it is useless to expect to influence the lesion unless the radio-therapy is applied so vigorously that an *x*-ray burn is almost inevitable.

In leukemia, the early commencement of treatment is even more important, as in the later stages the exposures must be made with great caution. At first, short exposures are made to avoid inducing radio-toxic symptoms, and

(3) Zeitschr. f. klin. Med., Jan. 2, 1909.

especially to avoid injuring the sensitive capsule of the spleen. There are large masses of tissues to be influenced in leukemia, and consequently there is the greater danger of intoxication from absorption of the decaying masses. After eight or ten exposures they suspend treatment for a week, but supervise the patient's blood and weight. It is particularly important not to begin treatment too vigorously in leukemia, and to supplement the radio-therapy with hygienic-dietetic measures. The patient must also be kept under supervision later, and treatment resumed at the first sign of recurrence, even if only objective. The main point in leukemia is to work with as small a dosage of the rays as possible, utilizing the late action of the rays. Patients unable to have the benefit of hygienic-dietetic measures and freedom from care, are not so liable to derive benefit from radio-therapy; but, under favorable conditions, it seems to postpone long the fatal outcome, while relieving the patients of their pain.

In many cases, however, notwithstanding great improvement, the danger of acute exacerbation seems to be made more impending by the radio-therapy. In one case, six courses of Roentgen treatment were given in less than four years, and always with marked benefit, but there is no case on record of actual permanent recovery. The tissues in time seem to become immune to the action of the *x*-rays, which thus lose their influence.

The tubes are of the four or five strength (Walter's scale), and a tin-foil filter is used with them. Of the 19 cases of leukemia, 10 of the 13 myelemic and 2 of the 6 lymphemic patients were benefited very much by the treatment.

The X-Ray in Exophthalmic Goiter. Jergensen[4] reports 17 cases of exophthalmic goiter in which a systematic course of Roentgen treatment was instituted. In only 2 instances did the thyroid show any sign of decreasing in size, and none of the symptoms were improved in any patient to an extent to justify the assumption of any direct curative action. Some of the patients found the nervous symptoms improve somewhat, and they gained a little in weight; but this occurs almost always when such patients are admitted to the hospital. He concludes by urging

(4) Hospitalstidende, Dec. 3, 1908.

surgical procedure when the exophthalmic goiter does not improve under hygienic-dietetic measures.

A review of the treatment of exophthalmic goiter by use of the *x*-ray in 51 cases leads G. E. Pfahler[5] to draw the following conclusions: 1. Decided improvement may be expected in about 75 per cent. of cases. 2. This improvement consists of an increase in weight and strength, and gradual disappearance of the Basedow symptoms. 3. Some improvement should be noticed within a month, and after six to a dozen treatments. 4. When this treatment is properly given there appears to be no danger. The permanency of the results is still an open question. The reports here presented were carried out to periods varying from a few months to three years after the cessation of treatment. The earliest and most noticeable improvement is in body weight. The symptoms most obstinate to treatment are the thyroid enlargement and the exophthalmos. If some improvement is not shown after one month of treatment, the latter should be discontinued for one month and then resumed. The rays should be localized upon the goiter and may be carried to the point of producing a mild dermatitis, but no farther. The author believes that this plan of therapy deserves a more general trial than it has yet received.

The Effect of the X-Ray upon the Testicles. Herxheimer and Hoffmann[6] have studied the effect of the *x*-ray on the testicles by experiments on rabbits. They conclude that the most differentiated cells, namely the spermatozoa, are the first to be injured by the rays; later the various cells out of which spermatozoa develop are affected. The basal cells of Sertoli on the other hand begin to increase in number, and with the greatly proliferated interstitial cells fill up the seminal canals. After a certain time a few remaining partly differentiated cells begin to regenerate the seminal elements, which process is much more complete than has been assumed from previous experiments. Spermatozoa are certainly produced in such regeneration, and this observation is of great practical value in the light it throws upon the possible outcome of similar *x*-ray injuries in human beings.

(5) N. Y. Med. Jour., Oct. 24, 1908.
(6) Deutsche med. Wochenschr., Sept. 3, 1908.

YEAST.

Yeast in the Treatment of Leucorrhea. Abraham[7] announced in 1902 that living yeast had a destructive action on bacteria, especially the gonococcus, killing it in six hours' contact, streptococci in thirty-two, and staphylococci in forty hours. Killed yeast cells do not have this bactericidal action unless mixed with sugar. The bactericidal action is not connected with the living cells or fermentation products, as it continues after the cells have been killed, as in compressed and dried yeast if mixed with sugar, but not without this admixture.

He applied the facts thus learned to treatment of leucorrhea; and his experience in this line, he states, has confirmed the efficacy of yeast in treatment of gonorrheal and non-gonorrheal inflammation, erosions and similar lesions, both vaginal and uterine. For the last year or so, he has mixed the yeast with bolus alba as the most convenient vehicle. This insures also the advantages of the bolus. He adds to the mixture also a little sugar and alkali, the latter in the form of magnesium sulphate, sodium phosphate, and carbonate and potassium carbonate. The powder formed by this combination is durable. He applies it by insufflation, or introduces it in a gelatin capsule. The bolus alone cures temporarily, he says, but does not remove the cause, hence the trouble returns afterward; but the above combination seems to have a prompt and thorough action, not only drying up the source of the secretion, but also destroying the gonococci and other germs. Recent gonorrheal colpitis subsides rapidly under its influence. Erosions heal more slowly. Lesions in the uterus also heal as the sources of irritation and of constant infection in the vagina are cured. It is necessary, however, to mop out the cervix in case of much inflammation before applying the yeast mixture in order to insure good results. All but 14 per cent. of his patients in this class had the cervix inflammation subside. In nearly half of the cases of failure, the inflammation was kept up by some lesion in the adnexa.

(7) Monatsschr. f. Geburtsh. und Gynäk., January, 1910.

ZINC CHLORID.

Ill-Effects from Zinc Chlorid in Endometritis, and its Value in Uterine Carcinoma. O. von Herff[8] states that he has had occasion to observe serious injury done to the uterus by cauterization with zinc chlorid in endometritis. Still better results without injury can be obtained with a 50 to 90 per cent. alcoholic solution of carbolic acid, which is his preference for treatment of endometritis. When an astringent or iodin action is desired, he uses a mixture of five parts of alumnol with fifty parts each of alcohol and tincture of iodin. This can be applied as often as every second day. He much prefers this to formalin.

With the same energy with which he warns against zinc chlorid for endometritis, he advocates its use in case of inoperable uterine cancer. The zinc chlorid applied four or five days after curetting will give relief for a long period and has been known to effect a permanent cure. He applies it in the form of a paste made of equal parts of zinc chlorid and starch, with a few drops of glycerin. This is spread on a cotton wad, shaped to fit the cavity. It is removed after four, six, or eight hours. He never has observed any inconveniences from its use in this way although he has applied it in hundreds of cases. As the eschar is thrown off, hemorrhage may occasionally be observed, but this is liable with any measure. He has never observed symptoms of poisoning from its use in this way, and thinks that other causes were probably responsible for the symptoms in the 2 cases of alleged poisoning reported by Hofmeier.

(8) Muench. med. Wochenschr., Feb. 18, 1908.

PREVENTIVE MEDICINE.

HENRY B. FAVILL, A. B., M. D.

PREVENTIVE MEDICINE.

PROPHYLAXIS OF INFECTIOUS DISEASES.

P. Desfosses and L. Lagane[1] review the methods of dealing with the prophylaxis of contagious diseases according to the best French authorities. The causes of the various infections, the mode of contagion and the regulations as to notification and disinfection are given. Directions for disinfection are then described. The precautions to be observed on the part of the physician to prevent carrying infection are of interest. Physicians before entering the sickroom should put on a garment of white cloth that will easily show spots and that can be readily washed and disinfected. It is desirable for the physician before touching a typhoid patient or one sick with any contagious disease to put on rubber gloves and for the same reason he should wear rubbers over his street shoes. These can be rapidly disinfected by rubbing with a damp cloth wet with some disinfecting solution. On retiring from the room one should not forget to wash and disinfect the hands and face. For this purpose convenient arrangements should be made just outside the door of the room. After the hands have been washed and the nails carefully brushed the hands should be plunged in a solution of corrosive sublimate or better in alcohol.

Microzoa. J. F. McFarland[2] reviews our knowledge of the rôle of the microzoa in the conveyance and causation of disease and emphasizes the fact that we need to know all the facts possible as to the mode of transmission of a disease before beginning a campaign for its extinction. He insists on the principle that the surest way to prevent the spread of a contagious disease is to prevent the egress of the specific parasites from the living host.

(1) Presse Méd., Feb. 12, 1910.
(2) Penn. Med. Jour., June, 1910.

The efforts to restrict yellow fever founded on disinfection of excreta were as little suited to the object aimed at as if we were to-day to attempt to control malaria by careful disinfection of clothing and discharges, allowing the true infecting agent, the mosquito, to pass freely from patient to patient. Success in the prevention of yellow fever was achieved only when a clear idea of how the disease was transmitted was obtained. It is similarly true that disinfection of the dejecta and cast off clothing of diphtheria and scarlet fever patients will be of little avail in preventing the dissemination of the disease so long as patients or healthy individuals harboring the germs of these diseases in their throats are allowed to mingle with individuals who are not yet immune to these affections.

Infection by Mouth Bacteria. According to the *Therapeutic Gazette* Winslow and Robinson[3] found that under normal conditions a sufficient number of mouth bacteria are not expelled to be a practical factor in the spread of disease. The distance at which the infectious organisms are transmitted by coughing, sneezing and loud speaking is a very limited one. As a rule there is perfect safety in the air but a few feet away from the patient. They quote Koeniger as having shown that 60 per cent. of the bacteria in the mouth-spray disappeared from the air in ten minutes, while after twenty minutes less than 10 per cent. of the original number remained. While not minimizing the real danger from mouth-spray they, nevertheless, consider that this method of disseminating disease is not as potent a factor as has been usually believed.

Indeed, they go so far as to conclude from their investigations that aërial infection by tuberculosis very rarely occurs, and their work has led them to take sides with those who believe that ingestion, rather than inhalation, is the principal channel of infection even in those cases in which the bacteria are ordinarily discharged through the air in the form of a mouth-spray. This view, of course, emphasizes rather than diminishes the importance of precautions being taken to prevent the contamination of food by those who are coughing, sneezing, or speaking.

(3) Therap. Gaz., May, 1910. See also Jour. Infect. Dis., January, 1910.

The very fact that Winslow and Robinson have proved that a large number of micro-organisms are expelled in this manner and that they speedily disappear from the surrounding atmosphere emphasizes the fact that they rapidly fall in large numbers upon surrounding objects at lower levels, and when these objects are foodstuffs the results may be disastrous to those who ingest such materials.

The Fly as a Disseminator of Disease. H. G. Beyer[4] enumerates the following diseases which may be disseminated by the fly: Tuberculosis, possibly leprosy, cholera, plague, summer diarrhea of children, carbuncle, frambesia, oxyuris, tenia, swine plague and typhoid fever.

Elimination of Flies. According to E. P. Felt[5] the control of house-flies depends on recognition of the facts that flies cannot become abundant without favorable conditions for breeding, that exposed fly-producing material is unnecessary to civilization and that there must be a thorough understanding of the fundamental conditions controlling the multiplication of this insect. Light, moisture and manure or similar material seem to be essential to the multiplication of the fly. Making a specific application of these facts the author states that while domestic animals cannot be eliminated the manure from stables can be stored in a fly-proof receptacle, either a covered pit outside the stable, or a cellar so dark or so tight that flies will not or cannot enter. Manure can be treated with chlorid of lime, oil, and other materials so as largely to reduce, if not practically to eliminate, fly-breeding. Stables and pens should be kept clean and dry and the food for domestic animals which is liable to attract flies should be tightly covered. All miscellaneous waste, including decaying fruit, sweepings, dish or slop-water and most important of all, dejecta, should be disposed of so as to avoid all accumulation about the premises of moist decaying organic matter accessible to flies. Flies should be excluded from the sickroom and all food should be carefully protected from flies by the use of screens. In addition to this the few flies which enter the house should be caught by sticky fly-paper which is preferable to poisonous prepa-

(4) N. Y. Med. Jour., Apr. 2, 1910.
(5) N. Y. Med. Jour., Apr. 2, 1910.

rations which are likely to result in dead flies dropping into food.

Communication of Disease by Vegetables and Fruit. The following suggestions as to the danger of conveying disease by fish, shellfish, fruit, and vegetables are offered by M. B. Ahlborn[6]:

No fish, shellfish or mussels should be allowed to be sold to the public if coming from waters in any way contaminated with sewage, or in danger during certain weather conditions such as high water from becoming so, as the typhoid bacillus is readily spread in this manner, particularly when the food material is eaten raw as in the case of oysters and clams. All containers for such foods should be clean and sanitary, and when exposed for sale they should be protected from dust and flies.

As a rule very little attention is given the spread of infectious diseases by fruits and vegetables, yet they, too, play their rôle, and it is quite an important one in the carrying of the producers of disease to human beings. No vegetables should ever be cultivated and sold where human manure has been used as a fertilizer, as they are often eaten raw, and it would mean an ideal method for the spread of typhoid fever, which condition has arisen in different localities, particularly in European countries. No vegetables or fruits should be washed in water which is under suspicion of containing disease-producing organisms, this holding good particularly where the city's water supply is under suspicion. All fruits and vegetables should be offered for sale in dust and fly-proof containers. The small fruit stand, often situated on the corner of a dirty street, with its wares exposed to the infected dust of the thoroughfare, could be abolished without much loss to the community, together with its filthy owner, often tuberculous, who spends his time spreading his malady by expectorating on his wares and shining them with a dirty cloth.

Tuberculosis.

State Control. The methods of a comprehensive antituberculosis campaign are outlined as follows by W. C. White[7]:

(6) Penn. Med. Jour., June, 1910.
(7) N. Y. Med. Jour., Dec. 25, 1909.

1, Care and segregation of advanced cases; 2, the cure of early cases; 3, the education of the community in proper sanitary precautions, including sputum destruction; 4, the registration of all cases in every community; 5, the care of children in the matter of increasing their resistance through medical inspection, open-air schools and playgrounds; 6, the segregation of the tuberculous in institutions of various sorts, such as asylums, orphanages, etc.; 7, milk and meat inspection.

The relative part to be taken by the municipality and by the state in suppressing tuberculosis and caring for the tuberculous is also discussed. The prevention of tuberculosis can best be accomplished by governmental effort and should be carried on under a definite and well thought out plan. The state can provide such a plan and see that the work of the different governing bodies is properly coordinated; but as state laws must necessarily be enforced by local authorities and supported by local public opinion, it seems best that each community or municipality should be charged with the care of its own tuberculous patients and with the duty of preventing the spread of the disease, the different local authorities working in conjunction with each other and with the state board of health to carry out a set of uniform regulations.

After considering human tuberculosis from several viewpoints G. Homan[8] reaches the following conclusions as to the measures necessary to meet the problem in the proper way:

1. In thorough-going sanitation, rightly supported and directed, are to be found the weapons and resources with which a now pandemic infection may be met and overthrown.

2. Statistics, properly collected and kept, afford the only true measure of health or disease in a given body of people, and constitute an index showing where sanitation is needed, and how it should be applied.

3. Sentiment, the sense of loss or fear of loss in the individual and public, is often the compelling cause or force that moves a heedless or ignorant people to better things in public health affairs.

4. Statesmanship, rightly directed, possesses the

(8) Jour. Am. Med. Assoc., Feb. 26, 1910.

promise and power of fundamental changes in economic directions through enlightened legislation, and in the supplying of funds needed for overcoming disease. These possibilities are now only dimly seen, but when realized in public policy and law will foreshow the virtual extinction of tuberculosis, as a population infection.

Control by the Physician. The duty of the family physician in the prevention of tuberculosis has not been sufficiently emphasized in the opinion of J. Girdwood.[9] He owes a duty to his patient to make a careful diagnosis by attention to early symptoms, thorough physical examination, examination of sputum, tuberculin tests, etc. Having made a correct diagnosis it is his duty to tell his patient the truth about his condition. The physician also owes an important duty to society and to the state. In many states the law requires the reporting of cases of tuberculosis. That this requirement is not fulfilled is shown by the fact that in the state of Maryland only about 37.5 per cent. of the physicians are complying with the law. 595 physicians reported 1,483 cases, while 17 dispensaries and hospitals reported 1,130 cases and the tuberculosis nurses reported 870 cases. The author estimates that of all cases reported to the State Board of Health 90 per cent. are in the second and third stages and not more than 10 per cent. in the early stage. This indicates that through incompetency, carelessness, or for economic reasons that are not a credit to the physician, either an early diagnosis is not made or the case is not reported.

A. Czerny[1] emphasizes the importance of informing the patient as to the nature of his disease, especially in the case of a mother, who otherwise may transmit the disease to her child; or in the case of wet-nurses and foster-mothers, who may readily convey the disease to the children whom they care for and in this way greatly promote the spread of the contagion.

Co-operation of the Laity. *Christmas Stamp.* The importance of the educative effect resulting from the use of Christmas stamps as well as the financial aid given to the antituberculosis crusade are emphasized by S. A. Knopf[2] who appeals to his readers to make good use of this

(9) Jour. Am. Med. Assoc., Dec. 4, 1909.
(1) Berlin. klin. Wochenschr., Nov. 15, 1909.
(2) Buffalo Med. Jour., January, 1910.

simple means of promoting the cause. In conclusion he says: "The Red Cross Christmas stamp is not good for postage. It will not carry any kind of mail but any kind of mail will carry it. The use of the beautiful Red Cross stamp carrying Christmas and New Year's greetings, gives an excellent opportunity to everyone to help the antituberculosis cause according to his means. The layman will thus be the co-worker of the physician, a true brother and helper. He who makes his Christmas offering by the purchase of as many of these stamps as he can afford to buy will surely feel the season's joy all the more, knowing that through his participation in this work somewhere some consumptive sufferer has been helped, some dark home made brighter, some little child saved."

The importance of the co-operation of the laity in efforts for the prevention of tuberculosis is emphasized by Livingston Farrand[3] in the following words: "Anything operated by physicians alone is entirely ethical and entirely inefficient. Any effort operated by the laity alone, in the line of public health, goes off on a tangent of some sort, and has not the balance of those who can speak from an authoritative point of view. It is necessary to have the co-operation of both sides."

Etiology. *Trades.* Among the occupations that favor tuberculosis B. C. Keister[4] enumerates the dust-producing trades, among which the cement factories are very prominent. The workers are surrounded by and work in an atmosphere made foggy with small particles of quicklime. The cement factories of America might well be called the homes of tuberculosis. This applies with equal emphasis to the fertilizer plants, glass factories, cotton mills, coal mines, etc. In glass factories, children do a large part of the work, and while the father is breathing quicklime dust in the cement factory his child is breathing pulverized glass in the glass factory. The one eats the tissues of the lungs, the other irritates them, until they are in a receptive condition for any germ disease. While the fathers are being crushed, crippled and killed in the coal mines, their children are working in the coal-breakers above. For ten or eleven hours a day these children of

(3) Long Island Med. Jour., June, 1909.
(4) Gaillard's South. Med., December, 1909.

10 or 11 years of age, stoop over the chute and pick out the slate and other impurities from the coal as it moves past them. The air around them is so black with coal dust that they are compelled to wear lamps on their caps at noonday in order to see the coal which is moving under their feet.

Many of these children contract miner's asthma, and finally develop pulmonary tuberculosis. There are now in this country 42,000 children employed in mines and quarries. Eighty-two thousand children are to-day breathing the lint of cotton mills in the United States. 5,365 are breathing pulverized glass from glass factories. 11,462 are steeping their systems in the nicotin of tobacco factories.

In the laundries of our countries little girls and young maidens are standing all day sorting filthy linen or feeding flat-pieces into a hot mangle, where the heat is so intense that they are compelled to work almost without clothing. Many times they are worked far into the night and must return to their homes through the dark and deserted streets of our cities in all kinds of weather, uncared for and unprotected. We can readily anticipate the risk these young girls run in leaving these steam-heated apartments and rushing out into the crisp, wintry night air, trudging their way through the snow or rain to their respective homes in some distant and perhaps unsanitary part of the city.

According to Keister the financial loss to this country as a result of tuberculosis is estimated to vary from $200,000,000 to $400,000,000.

Dust. E. A. Pierce[5] calls attention to the dangers of dust, especially for farmers, declaring that a large portion of tuberculous cases are found among the residents of the farming districts where dust storms are prevalent. All dusty occupations should be avoided as much as possible, and particularly so by those who are in imperfect health or have bronchial troubles. The national government has just issued a comprehensive volume on the danger to health from dusty occupations.

He gives the following rules for consumptives while visiting or traveling: Do not spit except in a receptacle,

(5) Northwest Med., December, 1909.

the contents of which are to be destroyed before they may become dry. The paper napkin should be used for receiving the sputum, particularly where it is convenient, and should be burned after being received in a paper bag The paper napkin should be used in front of the mouth while coughing, to avoid particles of sputum escaping. When traveling, a suitable bottle should be used to receive the sputum which should be immediately emptied and cleaned upon returning home. Patients should carry napkins with which to wipe the mouth after spitting, and these should be destroyed after being used.

Bovine Tuberculosis. H. L K. Shaw[6] points out the confusion existing in regard to the importance of bovine tuberculosis in the etiology of tuberculosis, and quotes the expression of Adami that the more we have studied the more we have been reducing the number of cases that are of bovine origin and increasing the number of human origin. He calls attention to the fact that healthy calves fed on the milk of tuberculous cows failed to develop tuberculosis, although more susceptible to bovine infection than children, and also to the rarity of primary intestinal tuberculosis. He insists on the correctness of the view of Cornet and others that wherever tubercle bacilli are introduced into the body they either produce a localized tuberculosis or else involve the regional lymph glands surrounding the area of infection. He declares that bovine tubercle bacilli have never been detected in the sputum of tuberculous patients. The natural conclusion from this is of great value as statistics show that fully eleven-twelfths of deaths from tuberculosis are from the pulmonary variety and only one-twelfth from all other forms of the disease. A number of pathologists have found bovine bacilli in tuberculous glands. Th. Smith from his personal investigations and study of the literature believes that between 1 and 2 per cent. of all cases of tuberculosis will show bovine bacilli, and that in individuals over 12 years of age they will be found only very rarely.

Shaw cites the case of an infant supposed to have contracted tuberculosis from a cow. When the organs of the infant were examined the bacilli were found to be of the human type, while the cow after slaughtering was proved

(6) Jour. Am. Med. Assoc., Nov. 27, 1909.

to be free from tuberculosis. A circular letter of inquiry revealed marked difference of opinion between the members of the American Pediatric Society. It is thus seen that the question is far from settled. Shaw believes that cattle may transmit the disease in rare instances, but he thinks that in view of the practical bearing of the question a systematic study of bovine tuberculosis and its transmission through milk should be made.

In discussing the evolution of modern preventive medicine as illustrated by the present campaign against tuberculosis G. S. Woodhead[7] shows that a great change has occurred in our conception of tuberculosis within recent years. In spite of the objections of Koch it has been established that the tuberculosis of man may arise either from human or bovine infection. Consequently the campaign against tuberculosis must take into consideration both sources of the disease. He suggests that there may be tuberculosis-carriers both among human beings and among cattle.

In tuberculosis we must, of course, take every possible precaution to prevent the transmission of infective material from man to man and must at the same time make certain of getting rid of that comparatively small, but certainly not negligible, danger of infection of our child population having its source in tuberculosis of bovine origin. It is the more important that this should be undertaken because in some ways there are fewer obstacles to its elimination than in the case of tuberculosis transmissible from the human subject: and, in any case, if this type of the disease can be eliminated from the children of the nations there will be so many fewer centers of infection and some at least of these children will grow up stronger and healthier, and better able than they are at present to stand the attack of other forms of disease.

Without denying that bad hygiene and other influences constitute factors in the etiology of tuberculosis the author believes that we can accept with confidence the dictum: "No tubercle bacillus, no tubercles." Most efforts at prevention are directed towards avoiding infection from human sources and they have accomplished great results; but if we could in this way banish from our midst the

(7) Med. Rec., Mar. 5, 1910.

various strains of tuberculosis from human sources we would not get rid of tuberculosis so long as we allowed the disease to exist in the lower animals. We may say that every tuberculous cow is a potential or actual center of infection for other bovines, and, though perhaps in a lesser degree, for the young child and, quite possibly in a lesser degree still, for the young adult. How are we to get rid of these centers of infection? A counsel of perfection would be to examine and test with tuberculin all animals, whether suspect or not, to destroy all that react, place all that remain unaffected in disinfected, well-ventilated and lighted sheds, and repeat the process until all tuberculous cattle are eliminated.

Such a procedure is, of course, impracticable and, as Bang has pointed out, is not necessary. He has succeeded, by careful isolation of the infected animals, by the elimination of animals that are in an advanced or open condition of tuberculosis, and by sterilizing the milk fed to young animals, in gradually freeing from tuberculosis valuable herds of cattle and thereby in giving us a guide for our own work. By all means let us educate the stockbreeder and the dairy farmer to a proper appreciation of the value of tuberculin; let us look forward to the time when the tuberculin tests will be applied as a matter of course whenever there is the slightest suspicion of the presence of tuberculosis in an animal or herd, but let us not wait for this before doing something to try to rid our herds of the more dangerous cases of tuberculosis.

All medical officers of health and veterinarians will receive with open arms and welcome the recommendation of the recent congress at Washington that a beginning should be made by eliminating cows suffering from tuberculosis of the udder from all dairy supplies. The importance of this is obvious to any one who has given a moment's consideration to the question, or has examined the sediment from half a dozen specimens of milk drawn from such cases. This, however, is the first step merely, and the addition of cases of advanced or open tuberculosis to the list of cattle to be condemned would be an eminently wise and satisfactory addition. It may be that we shall have to accept this as a first installment of what we now aim at, and it appears possible that it may be advisable to

confine our attention, in the first instance, to this special point. It would certainly be well worth our while to cut out these very active centers of infection, centers corresponding to the human patient who suffers from advanced phthisis, a patient whom we desire to keep under as close control as possible but whom we keep isolated in a hospital instead of pole-axing him. I believe that in time those who now resent interference with any but the manifestly diseased cattle will come to see not only the propriety but the economy of getting rid of cattle tuberculous in any degree. That, however, is not yet, and in the meantime it is well that we should aim at the attainable.

Danger from Tuberculous Animals. B. Möller[8] concludes with Weber that the danger which threatens man from the use of milk and milk-products from cows with tuberculous udders is very slight in comparison with the danger arising from the human being with open pulmonary tuberculosis.

Infection by Cow's Milk. C. J. Whalen[9] discusses at considerable length the probability of infection through milk and draws the following conclusions: While infection from milk may be possible it is extremely infrequent, and the extent of the infection by the milk and flesh of tuberculous cattle and the butter made of their milk is hardly greater than that of hereditary transmission. He emphasizes the importance of destruction of sputum, general sanitary measures, isolation of tuberculous patients in the advanced stage, notification, disinfection, etc.

The Tuberculous Physician. The decision of the Oklahoma Board of Medical Examiners to exclude from license tuberculous physicians led S. A. Knopf[1] to protest against such a form of phthisiophobia. He shows that such physicians are uniformly neat and scrupulous as to the disposal of their sputum and not liable to convey the disease to others. They have contracted the disease in the performance of their duty and it would be inhumane to exclude them from practice. How valuable their services have been in the service of science and of humanity after they contracted the disease is shown by the record of Laennec, Brehmer, Dettweiler, Grancher, Solly, Trudeau and others

(8) Berlin. klin. Wochenschr., May 6, 1910.
(9) Ill. Med. Jour., January, 1910.
(1) Jour. Am. Med. Assoc., Sept. 25, 1909.

whose personal suffering and experience have made them the best leaders in the campaign against the great white plague.

Contagion in Hospitals. As the result of actual examination of the resident medical and nursing staff of the Mount Vernon Hospital for consumption and diseases of the chest, J. E. Squire[2] arrives at the following conclusion regarding the liability to infection with tuberculosis in a special chest hospital:

It would appear from the experience of the Mount Vernon staff that the risk of infection with tuberculosis in a special chest hospital is very small, and is apparently little, if at all, greater than in a general hospital. It is, perhaps, doubtful if there is any greater risk to the workers in any well-ordered hospital than amongst the general mass of town dwellers of similar social position. Infection with tuberculosis does occasionally occur as a result of the duties of a nurse, but probably not more frequently amongst the nurses in a hospital for consumptives than amongst the general body of nurses. Every occupation has its special risks, and the possibility of infection is one which members of the medical and nursing profession accept as a matter of course. The risk of tuberculous infection, even in a hospital for consumptives, appears to constitute a very slight danger.

Mothers and Children. The close association of tuberculosis with the home is illustrated by the frequency of its occurrence among housewives, especially those who are mothers, and among children—especially the children from homes in which there is a tuberculous inmate. The importance of paying special attention to the needs of mothers is emphasized by E. O. Otis[3] who cites the home for convalescent mothers founded by G. H. F. Schrader in honor of his mother under the name of "Caroline Rest," as an admirable example of what ought to be done for them on a larger scale. For the children his program is more extensive and comprises the following measures.

1. To learn through visiting nurses where the infected children are, and the examination of school children. 2. To place children with contagious tuberculosis under

(2) Brit. Med. Jour., Apr. 30, 1910.
(3) Boston Med. and Surg. Jour., Feb. 24, 1910.

sanatorium or similar treatment in the country. 3. To place non-contagious cases in open-air schools or in children's camps, and in case of bad home conditions in residential open-air schools or colonies. 4. To remove either the healthy child or the consumptive member from the consumptive family. 5. To place weak children especially susceptible to tuberculosis in separate schools or rooms where they can receive special hygienic attention. 6. The young children should not be nursed by consumptive mothers nor remain with them. 7. All school teachers should have their lungs periodically examined. 8. School buildings should be well ventilated and kept absolutely clean. In every school building there should be one so-called open-air room. 9. School children should be instructed in hygiene, and in regard to the nature and prevention of tuberculosis. 10. Children suffering from bone, gland or joint tuberculosis should be sent to seaside sanatoria.

Survival of Tubercle Bacillus. According to J. R. Williams[4] the researches of Kitasato have shown that about 95 per cent. of the tubercle bacilli in sputum are dead before the sputum is raised. The living tubercle bacilli found in sputum do not come from the caseous areas but from the living tissues around them. Bacilli live longer in dried sputum than in moist, so that sputum should never be permitted to dry. Direct sunlight is rapidly fatal. According to Koch tubercle bacilli die within a period varying from a few minutes to a few hours when exposed to direct sunlight. Cultures in thin smears on glass lose their virulence in half an hour under such conditions. Diffuse light requires a longer time. The tubercle bacillus in feces, urine, and abscess discharges lives but a short time outside of the body. Putrefactive changes in the excretions are very rapid and kill the contained germs very quickly. Since the proper conditions are absent the tubercle bacillus does not increase in numbers outside of the body. Cornet says: "It is, therefore, illogical to speak of a place or a dwelling as saturated with the accumulated growth of years of bacilli."

Prophylaxis. *The Function of Tuberculosis Dispensaries.* The functions of a tuberculosis dispensary as rep-

(4) Charlotte Med. Jour., June, 1909.

resented by the institution at Edinburgh and the similar one at Paddington are thus enumerated by D. J. Williamson[5]:

1. The reception and examination of patients, the keeping of a record of every case, with an account of the patient's illness, history, surroundings, and present condition, the record being added to on each subsequent visit.

2. The bacteriologic examination of expectoration and other discharges.

3. The instruction of patients as to how to treat themselves, and how to prevent or minimize the risk of infection to others.

4. The dispensing of necessary medicines, sputum bottles, disinfectants, and, where the patient's condition seems to warrant it, foodstuffs and the like.

5. The visitation of patients at their own homes by (1) a qualified medical man; and (2) a specially trained nurse, for the double purpose (*a*) of treatment and (*b*) of investigation into the state of the dwelling and general conditions of life, and the risk of infection to others.

6. The selection of more likely patients for hospital treatment, either of early cases for sanatoria or of late cases for incurable homes; and the supervision, when necessary, of patients after discharge from the hospital.

7. The guidance generally of tuberculous patients and their friends and proper answers to inquiries from all interested persons on every question concerning tuberculosis.

The following disposition is made of the patients examined:

1. The non-tuberculous are at once sent on to the general hospitals, or if they can afford treatment to their private doctor.

2. Those already under treatment elsewhere are not dealt with without the sanction of their present medical attendants.

3. The surgical cases of tuberculosis are (if needing treatment) sent to a suitable hospital.

4. The dying or otherwise highly infectious cases are, if living in such surroundings as to be a danger to others, removed, if possible, to a home for the dying, or infirmary.

5. The advanced and bedridden cases, if living in such

(5) Lancet, Mar. 26, 1910.

surroundings as not to be a danger to others, are treated at home.

6. The early phthisical cases are carefully considered with a view to sanatorium treatment and if judged suitable are sent to one or other of these institutions.

7. Those cases in whom the diagnosis of tuberculosis is very doubtful, or those who are considered to be predisposed to the disease, are looked after as described in an earlier part of this paper under the heading of "Preventive Treatment"; but should any intercurrent illness occur such as pneumonia or measles, or any gastro-intestinal disturbance, these cases are treated by their family doctor.

8. Delicate children, either phthisical or predisposed, may, if considered advisable, be sent away to the country, either to convalescent homes or sanatoria.

9. Such children may also be put in special open-air schools, where they may continue their education without injury to their health, and at the same time be trained to become healthy and hygienic citizens.

10. The remaining cases—*i. e.*, the bulk of the phthisical patients, too advanced or otherwise unsuitable for sanatorium treatment, and not sufficiently advanced to be sent to infirmaries or homes for the dying—are treated at the dispensary as at an out-patient department, with this difference, that the practitioner in attendance himself visits the homes and endeavors to discover and eradicate the source of infection and those unfavorable conditions which assist in the development of the disease.

Prevention of Disease in the Healthy. W. S. Mills[6] calls attention to the importance of maintaining physical vigor in order to escape the effect of germs necessarily inhaled. Many persons are disseminating tuberculosis germs through the atmosphere, either consciously or unconsciously, so that all are more or less exposed, and must frequently take into the system millions of tubercle bacilli. To prevent their taking root and growing, the well person must be kept in prime physical condition. Anything that tends to pull down a person, physically or mentally, makes him more susceptible to this disease. Right living and right thinking will keep him well. Here the layman can help.

Child labor is a potent factor in ruining health, and in-

(6) N. Y. Med. Jour., Feb. 19, 1910.

directly in producing tuberculosis. This is one great field of prevention.

Preventive Treatment. The object of prevention is not best subserved by the treatment of cases which have voluntarily come to the physician of dispensary, for careful estimates according to D. J. Williamson[7] show that only about 20 per cent. of these cases are curable, but an effort should be made to reach the incipient cases which do not yet show any positive signs. These must be sought for among the relatives of those patients who come voluntarily or among those who are intimately associated with known cases. For this purpose an effort should be made to seek out those who may be in the earliest stage and induce them to come for examination and advice. This is one of the purposes of the tuberculous dispensary.

Lectures to Children. In the opinion of L. Brown[8] there may be some question as to the value of lectures to adults. He is convinced, however, from experience at Saranac Lake that short talks to children on the value of prophylaxis against tuberculosis are productive of great good. With a limited number of children it is possible for the physicians of a town to deliver such talks, but in a city like Syracuse this is impracticable. In such places some such scheme as White has adopted in Pittsburg would be of great value. There they have a trained nurse, who having recovered from tuberculosis herself, goes from school to school with a portable exhibit, adapted for children. During the course of the year every child would know what to do to prevent tuberculosis if some of the leading citizens would place in the proper hands a fund sufficient for the purpose. Brown believes that to be efficacious, rules for the prevention of tuberculosis should be inculcated early.

Disinfection of Excreta. The method of disposal of the excreta as practised at the U. S. Marine Hospital Sanatorium for Tuberculosis at Fort Stanton, N. M., is described by P. M. Carrington.[9] The principal precautions relate to the disposal of the sputum. There is used at Fort Stanton a metal pocket cup and a bedside cup consisting of a light metal frame and a paper filler. The pocket cups

(7) Lancet, Mar. 26, 1910.
(8) N. Y. Med. Jour., Nov. 20, 1909.
(9) N. Y. Med. Jour., Feb. 27, 1909.

are disinfected daily by steam under pressure of two atmospheres, and the paper fillers are burned in crematories especially constructed for the purpose. The urine of all patients in the hospital, as well as of other cases in which there are indications therefor, is received in vessels containing a solution of carbolic acid or formalin, and of course the stools of patients with tuberculous enteritis are disinfected before being disposed of. Stringent regulations regarding spitting elsewhere than in the cups provided, are enforced.

Reduction of Tuberculosis Mortality. A. Gottstein[1] objects to the conclusions of B. Fraenkel,[2] who believes that there is a close correspondence between the increase in numbers of tuberculosis patients treated in the sanatoria and the decrease of mortality from tuberculosis. In opposition to the statistics of Fraenkel he calls attention to those of Newsholme[3] who found no relation between the sanatorium treatment and the reduction of mortality since the latter began at a time when the number of sanatoria was too small to be taken into consideration. The results of his investigations go to show that of all the factors to be taken into consideration, the removal of incurable patients from the population by their isolation in general hospitals has had the greatest influence on the prophylaxis of pulmonary tuberculosis.

Housing of Tuberculous Families. One of the first and most significant facts encountered by the student of tuberculosis, says H. L. Shively,[4] is that it is a disease of civilization, of housing, and of confinement. The sanatorium treatment, however valuable, can never be more than a relatively small factor in the great problem of caring for the tuberculous poor in large cities. It has been a growing conviction among workers in tuberculosis that for any lasting benefit to the great majority of consumptive patients the problem must be more vigorously attacked in the home itself. Instead of the impossible plan of sending the tuberculous poor to sanatoria, sanatorium conditions must be brought to them.

It has for a number of years been a cherished plan of

(1) Berlin. klin. Wochenschr., Nov. 29, 1909.
(2) Ibid., Nov. 6, 1909.
(3) Jour. of Hygiene, 1906, Vol. 6.
(4) N. Y. Med. Jour., Mar. 5, 1910.

Shively to aid in securing these desirable ends by the erection of a type of building in which tuberculous families might live and enjoy, at low rentals and as long as need be, many of the best features of sanatorium life. This plan has now been realized on an economical scale by Mrs. W. K. Vanderbilt, Sr. Four large buildings of a type especially designed for the purpose by Henry A. Smith are now in course of construction. Six stories in height, they will house 382 families in suites of from two to five rooms. It is intended that they shall be conducted in connection with the tuberculosis clinic of the Presbyterian Hospital, but tenants will also be received from other clinics and from private physicians.

A number of novel architectural features will be introduced. There will be ample courts for air and light to which access will be had through passage ways extending from street to street. Outside staircases in each of the four corners of the court will afford separate entrance to each suite of rooms, thus securing greater privacy and quiet for the tenants and eliminating entirely the dark ill-ventilated disease-breeding interior hall and staircase. The recesses in the angles of the courts in which the stairways are built will be lined with white glazed tile. At each turn of the stair there will be a seat let in the iron railing to provide a resting place for children and invalids. The entire surface of roof areas of the sanitary tenements will be utilized for fresh air treatment and outdoor life. The roofs will be fitted with open loggias, windbreaks, toilet rooms, comfortable seats, flowering plants and shrubbery to make them as attractive as possible and to encourage their fullest use by the tenants. On the street façades and the side fronting the park there will be individual balconies on every floor affording every opportunity for outdoor sleeping and dining.

Bedrooms and living rooms will be as far as possible situated in the front of the buildings with windows directly on the street; kitchens and bathrooms will be in the rear and be provided with ample light and air by windows opening on the stairs and large interior courts. Each suite of rooms will have its own bath room and hot water supply. The bath-rooms are built into the wall, and the floor material will be brought up to the bottom of the tubs

in such a way that dirt and dust cannot collect. The interior construction of the tenement will be fireproof and vermin-proof. Concrete, steel, brick and tile will be combined to make an effect as much like modern hospital construction as is possible. It is believed throughout that whatever is good, clean and sanitary in a hospital is equally good in the home. The house will be heated by hot water and lighted by electricity. A modern disinfecting plant will be a feature of the basement.

Sanatorium Treatment. M. Fishberg[5] criticises the sanatorium treatment and concludes that it is unfortunate that patients have come to look on the sanatoria as necessary to their recovery. Many more consumptives are being cured at home than in the sanatoria. The sanatoria admit only incipient cases which might get along well at home at a much lower cost to the patient and the community. The low mortality rates in sanatoria are in a measure due to the fact that all unfavorable cases are persuaded to leave for home. The ultimate results of sanatoria treatment are not as good as some authors would lead us to believe. According to Hammer and Croissant the results obtained in the treatment of consumptives in dispensaries are about the same, and from the standpoint of the duration of the favorable result even better. Economically sanatoria are expensive. The prophylactic results of sanatoria are of negligible value, considering that they admit the incipients and refuse the most dangerous, the advanced cases.

State Sanatoria. Two types of construction for public sanatoria have developed within the last few years according to E. R. Kelley.[6] First, large, grouped administration buildings with offices, dining-room, kitchen, etc., and separate bungalows for the patients. Second, administration buildings on similar lines, but with long open-air lean-tos, each accommodating from 8 to 40 patients, with central heated toilets and dressing-rooms for sleeping-quarters. Purely from an economic and administrative standpoint the lean-to seems to have the advantage in large public institutions.

Employment for the Tuberculous. In commenting on

(5) Med. Rec., June 12, 1909.
(6) Northwest Med., April, 1910.

the difficulty of inducing those who from long habituation or racial prejudice are confirmed city dwellers to take up a country life, A. Worcester[7] suggests the practicability of adopting other outdoor callings instead of agriculture. A Jewish colony for tuberculous patients had to be abandoned because of the dislike of farming. Worcester says: "Racial prejudices against ordinary farming and gardening and stock raising may not be conquerable, but there are many other profitable occupations for country dwellers, wherein, too, the disadvantage of climatic changes can be largely obviated. Thus more and more gardening is being done under glass. And then there is the great industry of poultry raising. There is no danger of glutting the market with eggs or squabs. This is an especially good chance for women. Forestry also offers good chances. But perhaps the best chance of all in this state can now be found in the crusade against the gypsy moths. What better employment could possibly be devised for a man seeking insurance against the return of his tuberculosis than in creosoting the nests of this modern pest that now threatens the existence of our forests?

"Such occupations as these fulfill all the specified requirements. But, as already has been intimated, it is also necessary to select other occupations for those who have always worked in shops, and who either are disabled from other and more active employments or who cannot be induced to move their families out of the cities into the more healthful country. For them opportunities must be provided where they can work in hygienic shops in an atmosphere free from dust and rich in oxygen. Such desirable conditions possibly cannot be secured in the large shops and factories. In them there would be the disadvantage, also, of intimate association with fellow-workmen, and the consequent danger, real or imaginary, of infecting them. There would also be the added disadvantage of obliging the somewhat handicapped workman to compete with his stronger fellows. These disadvantages would not be met in small handicraft shops, which now promise a most desirable revival or arts and trades that have been almost lost."

(7) Boston Med. and Surg. Jour., Oct. 21, 1909.

Typhoid Fever.

Etiology. While no important facts have been added to our knowledge of the causation and prevention of typhoid fever of late, attention is directed more than formerly to unusual methods by which the disease may be conveyed. The agency of flies and the danger from the contamination of vegetables, fruit, shellfish, etc., are not to be forgotten. The water-supply is, however, the general source from which epidemics arise. O. W. H. Mitchell[8] describes an epidemic of this disease caused by contamination of the water. Such contamination is very likely when a lake, spring, or river is the source of supply. Surface wells are also often the source of contaminated water, but deep wells and artesian wells have been thought to be especially safe. That such sources of the water-supply should also be carefully scrutinized is shown by a paper in which F. H. Bass[9] reports an epidemic of typhoid fever at Mankato, Minn., which resulted from contamination of the water of an artesian well with sewage. The epidemic serves to emphasize the necessity of a careful inspection of artesian wells in which contamination of the water, though unusual, is not impossible. The epidemic affected about 500 cases but by thorough supervision was suppressed in about three months.

Paratyphoid Fever presents symptoms indistinguishable from typhoid and there is little doubt that its germs may be conveyed in the same manner as the more common malady, but it has probably its peculiarities by which its mode of transmission differs in many cases from that of the form caused by the bacillus of Eberth. H. F. Hoskins[1] reports an epidemic of 35 cases at Weyer's Cave, Va., from which he draws the following conclusions:

"We believe that there prevailed at Weyer's Cave, Va., during the summer of 1909, an epidemic of a disease which was probably paratyphoid fever. We believe further that the epidemiologic studies failed to give any reasonable explanation as to the means of transmission of the disease.

"We believe that this condition was peculiar to the epi-

(8) Jour. Mo. State Med. Assoc., March, 1910.
(9) Jour. Minn. State Med. Assoc., Apr. 15, 1910.
(1) Jour. Am. Med. Assoc., Mar. 19, 1910.

demic in question, as further studies in the same neighborhood disclosed the prevalence of a disease which was clinically and bacteriologically true typhoid fever."

Prophylaxis. *Disinfection of Excreta.* A. F. Willier[2] describes the precautions to be taken in the prevention of typhoid as follows: The patient should be isolated and excreta (stools, urine, vomitus and sputum) disinfected. Complete isolation of the patient should be sought. Special wards should be provided in hospitals, and in private homes special apartments should be reserved for the patient, and none but the attending physician and nurse should enter, since the attendant may carry the bacilli directly by handling food or drink, which in turn may be given to healthy members of the household. If extreme care is not exercised, the excreta may become dry and scatter about or be carried by flies to meat and milk and there multiply indefinitely. Dried bacilli may also be inhaled and swallowed. There is, too, incontestable proof that typhoid fever is slightly contagious. The sickroom should be kept absolutely clean, well ventilated, free from all unnecessary furniture, screened to keep out flies, and have a sunny exposure if possible. The patient should be sponged regularly and all soiled clothing at once removed. He should at all times receive careful attention, and after each movement of the bowels, the anal and sacral regions should be cleansed with a disinfectant solution, carbolic acid 1-40 or bichlorid of mercury 1-1,000. After micturition, or if any urine has been spilled, the same thing should be done. The physician and nurse should cleanse their hands with a mild antiseptic solution after attending the patient. But it is to the importance of a thorough disinfection of the urine, feces, sputum, vomitus and bed-linen that this paper is primarily directed, since the value of their disinfection is of paramount importance in considering the prophylactic or other treatment of typhoid fever, striking as it does, at the root of the evil. This is by far the principal prophylactic measure of the typhoid fever problem.

Bacillus-Carriers. The importance of typhoid-carriers is emphasized in an editorial article by the *Journal of The American Medical Association.*[3] The Journal says:

(2) Jour. Mo. State Med. Assoc., May, 1910.
(3) Aug. 13, 1910.

"Evidence is accumulating that the share of the typhoid-carriers in disseminating infection has not been overestimated. It is safe to say that a large part, perhaps the largest part, of the "residual" or "prosodemic" typhoid observed in a community possessing a pure water-supply is to be attributed to contact infection. Even milk-borne epidemics are being traced in a surprisingly large number of cases to contamination of the milk by bacillus-carriers at the time of collection or in the course of distribution. The facility with which typhoid bacilli multiply in milk naturally renders this foodstuff a relatively common vehicle of disease, but the way contamination of the milk occurs is in many cases precisely similar to the mode of contamination of any other article of diet. There can, furthermore, be no doubt that a part of the danger lurking in open privies is due to their use by unrecognized carriers, using this term in the broad sense. Well-defined cases of typhoid are, of course, responsible for some scattering of infection of this character, but much also must be laid at the door of the "walking" patients, the healthy carriers and the obscure cases. To these are now to be added those individuals who, as shown by Conradi, Mayer and Drigalski, may be discharging typhoid bacilli in the stools or urine for as long as eight, eleven, or even twenty-five days before the malady has become clinically manifest. The recent discovery that children suffer not infrequently from a mild, ambulant, unrecognized form of typhoid is also important in this connection. Several epidemics in western Germany have been traced to clinically unrecognized cases of this character. Altogether the living distributors of typhoid bacilli make up a formidable array.

"Perhaps one reason why typhoid fever does not diminish more rapidly when cities substitute a pure water-supply for a polluted one is that in such cases there is a legacy of carriers handed on from the days when water-borne disease prevailed excessively. The carriers produced by years of infected water-supply do not disappear at once, but linger on and generate new foci long after the original trouble has been removed. A hopeful feature of the situation is that the effect of preventive measures is cumulative. Progress in the purification of water-supplies will

in the long run decrease the number of carriers. The discovery and control of a single carrier, particularly in occupations such as the purveying of milk which involve special danger, may be the means of preventing the formation of many new carriers."

H. Rondet[4] considers the etiology and prophylaxis of typhoid fever and concludes as follows:

1. Typhoid fever epidemics are most commonly due to contamination by a series of bacilli-carriers and are rarely caused by contaminated water.

2. Whatever the source of typhoid fever, whether from the water or by means of bacilli-carriers, in order that the swallowed bacilli may bring about the typhoid fever they must be absorbed soon after their evacuation from the patient's intestine.

Courtois-Suffit and Beufume[5] report a small epidemic of typhoid introduced into a village by a woman who was a bacillus-carrier, and later spread from one patient to another by contagion among those who were closely associated with each other. The mode of communication impressed itself on the villagers to such an extent that a practical social quarantine which extended to an entire avoidance of the end of the village in which the cases were situated, was established, and this soon put an end to the epidemic.

R. C. Rosenberger[6] reviews the literature of typhoid-carriers and quotes from Connell[7] the following suggestions as to the disinfection of the urine. Directly the fever approaches the normal every typhoid fever patient should be given half a gram of hexamethylenamin, three times a day, for three consecutive days of each week, and if bacilluria becomes established the drug should be administered for continuous periods of a week. This intermittent method of treatment should be continued for four weeks into convalescence, and if the organism is not eradicated by this means the bladder should be washed out daily with 1 in 5,000 silver nitrate solution or some other antiseptic, while the rare chronic ulcerative cases should be drained by cystotomy.

(4) Lyon Méd., Nov. 28, 1909.
(5) Gaz. des Hôp., Mar. 17, 1910.
(6) N. Y. Med. Jour., Mar. 26, 1910.
(7) Am. Jour. Med. Sciences, May, 1909.

Dogs as Typhoid Bacilli-Carriers. J. Courmont[8] found that 10 out of 12 dogs tested eliminated typhoid bacilli with the stools regularly for four or five days after eating a single meal of food experimentally contaminated with typhoid bacilli. The bacilli seemed to pass through the dog's body without causing either symptoms or lesions, but it is evident that during the five days following the ingestion of typhoid material the dog is liable to be a dangerous bacillus-carrier.

Inoculation. M. M. Eckelman[9] describes as follows the results of typhoid inoculation. The statistical results of typhoid inoculation have from the very start been very gratifying. In Wright's earlier statistics the incidence of typhoid fever was diminished by at least half in the inoculated. In certain other cases a greater reduction in the incidence of typhoid fever was achieved, a reduction varying from a 6-fold to a 28-fold reduction. In the aggregate the proportion of deaths to cases among the inoculated has been rather less than half that among the uninoculated. The latest statistics from the British armies show results as follows: Incidence per 1,000 among the un-inoculated 21.32 as compared with 9.80 among the inoculated. Mortality per 1,000 among the uninoculated 5.18 as compared with 1.36 among the inoculated.

Duration of the protection varies from 6 months to 2, 3 or even 6 years, or in some cases even a lifetime. The method has been recommended for use in the hospital corps and the army nurse corps and in any expedition of troops from the regular army which is ordered to take the field for active operations. Volunteers for the army should be given an opportunity to be protected from typhoid by vaccination. In the presence of epidemics in civil practice, vaccination should be considered as a means of protecting the unaffected. It is especially appropriate to vaccinate nurses, hospital attendants, physicians and others, who are constantly exposed to typhoid infection. Typhoid-carriers who constitute about 4 per cent. of all persons who have had typhoid fever should also be vaccinated.

(8) Bull. de l'Acad. de Méd., June 28, 1910.
(9) Jour. Indiana State Med. Assoc., Apr. 15, 1910.

Plague.

Mode of Infection. In discussing the agency of invertebrate animals in conveying disease, P. VonderMühl[1] remarks that the epidemiology of the plague is well known. The difficulty in prophylaxis lies in the fact that there are different species of fleas that infest men and rats, and these have different habits of life, so that additional study is needed to show the necessary precautions to take to prevent their transference from infected rats to men. The transference of the plague from an infected locality to one not yet affected is due generally to the transport of the germs by fleas attached to healthy or already infected men or to pieces of clothing or bedlinen.

Ground-Squirrel as Carrier. The discovery that ground-squirrels are frequently infected with plague has extended the battle against this disease into a new field and offers some complications which may be difficult to overcome. W. C. Rucker[2] describes some of the efforts to determine the character and extent of this infection and the best mode of dealing with it as it is found in Contra Costa County, Cal. Various methods of destroying the animals have been tried. Poisoning has been used with some success, but it is found that phosphorus can not be used against squirrels as effectively as against rats. Poisoned wheat, according to the appended formula, gives good results when the food supply is short, as in the winter months, if care be taken that other animals do not partake of it. Trapping has not been very successful. Flooding the warrens is useful only when combined with the destruction of the escaping animals.

A study is being made of the natural enemies of the squirrel with a view to perfecting a plan for the wholesale destruction of the pests. In all about 250 infected squirrels had been found up to Oct. 1, 1909. It is hoped to enlist the co-operation of the farming population who would be saved a considerable monetary loss by the eradication of these animals.

The following is the formula for poison referred to above:

(1) Correspondenzbl., f. Schweiz. Aerzte, May 20, 1910.
(2) Jour. Am. Med. Assoc., Dec. 11, 1909.

Strychnin	1 oz.
Cyanid of potassium	2 oz.
Eggs	1 doz.
Honey	1 pt.
Wheat or barley	30 lbs.

Stir eggs well, then mix in honey and again stir. Then put in dry powdered strychnin and cyanid and stir until well mixed. Put wheat in large box or can and pour in the mixture of poison and stir until it is well distributed over the wheat. Stir two or three times during twenty-four hours, then spread out and dry. Before putting it out for the squirrels add 1 dram of oil of rhodium.

The work which is now going on is directed at the eradication of a permanent focus for plague, and it is felt that the successful completion of this undertaking will rid America of a slumbering volcano of plague, liable to eruption and great devastation at any time. This is a departure into a new field of sanitation and may be considered an advance in preventive medicine.

Cholera.

The Rôle of Nitrites. In 1893 Emmerich suggested the ingenious hypothesis that the symptoms of cholera are essentially the result of poisoning by nitrites. The theory received little attention but he has recently reasserted it.[3] A. A. Hymans van den Bergh and A. Grutterink[4] have taken the opportunity afforded by a recent small epidemic of cholera at Rotterdam to investigate this hypothesis. They found 2 patients who died soon after their reception at the barracks and who were very cyanotic before death. They were able to investigate one case, in which the blood was moderately cyanotic, with an entirely negative result. To this may be added another case studied some years ago in which it was not possible to recognize either methemoglobin or nitrites in the blood. They conclude, therefore, that there is no evidence that the symptoms of cholera depend on the nitrites.

No method of treatment or prophylaxis based on the use of a nitrite-free diet can be expected to give any special success. Since the biologic chemistry of cholera is not well understood and no specific treatment has proved practically applicable, it is necessary to employ the method of Koch against this plague. This has been done with marked success in Rotterdam where the efficient activity of the authorities made it possible to suppress the epidemic in

(3) Muench. med. Wochenschr., Sept. 21, 1909.
(4) Berlin. klin. Wochenschr., Nov. 8, 1909.

ten days. There is no occasion in connection with this disease to depart from the established rules.

Infection in the Laboratory. S. J. Zlatogoroff[5] reports a case of cholera produced in a laboratory worker by the accidental ingestion of a culture of a vibrio derived from water taken from the Neva river. This involuntary experiment shows, according to the author, that a vibrio occurring in water during an epidemic may cause cholera as well as those derived from human beings, and that the passage through the human organism increases its virulence for guinea-pigs. This case permitted the determination of the incubation period which was 58 hours.

Smallpox.

Vaccination. J. F. Schamberg[6] after a thorough consideration of the effective character of vaccination and its relation to smallpox and to animal experimentation sums up his results as follows:

1. Vaccination, when properly and adequately employed, protects one against smallpox. Even those intimately exposed to the disease, as physicians and nurses in smallpox hospitals, may be rendered completely immune against smallpox by vaccination and revaccination.

2. Vaccination protects against smallpox in the same manner that one attack of the smallpox protects against a second attack. Vaccination has the special advantage in that the immunity which it confers against smallpox may be renewed when it becomes impaired or exhausted.

3. Vaccination in order to confer protection must be genuine; the mere production of a "sore arm" is of itself no proof that the subject has been successfully vaccinated. The vaccination must run a definite course before a protective substance is left in the body.

4. Smallpox may develop in vaccinated persons if they permit years to elapse without revaccination.

5. Vaccination and revaccination universally applied are capable of exterminating smallpox as an epidemic disease. The experience of Germany during the past thirty-five years proves this.

6. In isolated instances individuals in a generally well-

(5) Berlin. klin. Wochenschr., Nov. 1, 1909.
(6) Jour. Am. Med. Assoc., Mar. 26, 1910.

vaccinated community may develop smallpox because their protection is imperfect as a result of the use of an inert virus or some other fault of technic. These cases, however, will never appreciably influence the prevalence of the disease in such a community.

7. Smallpox was an ever-present and terrible pestilence in the days before vaccination. In most civilized centers it is to-day a relatively rare disease. This change has been effected almost exclusively by vaccination. Epidemics of smallpox prevail from time to time when the spark of infection is introduced into the community and a sufficient amount of unvaccinated combustible material exists to lead to a general conflagration. In countries where vaccination is neglected, as in Persia, Asiatic Russia, etc., etc., smallpox is still a death-dealing scourge.

8. The foes of vaccination commonly refer to the infrequency of smallpox at the present day and to the remote liability of contracting the disease. They forget that the relative security which we now enjoy is the result of vaccination. This security can be made absolute or it can be largely destroyed according as vaccination and revaccination are generally employed or generally neglected.

9. The dangers connected with vaccination have been greatly exaggerated by the opponents of this measure. Vaccination causes an abrasion of the skin and in rare instances this wound, like other wounds may become infected, especially when neglected or maltreated. With the selection of a proper virus and care of the vaccination site during and after vaccination, the risk in any individual instance is an entirely negligible quantity. The risk connected with vaccination is infinitesimal compared with the peril of remaining unvaccinated.

Necessity of Revaccination. In a discussion at the Royal Academy of Medicine in Ireland on a paper on prevention of smallpox by E. J. McWeeney[7] the author contrasted the protection given in Germany under the system of compulsory revaccination with that in Great Britain where this system is not in vogue. Sir John Moore said in his opinion the failure of the present system of dealing with smallpox is in the lack of revaccination. Primary vaccination in infancy confers an absolute immunity for the time

(7) Lancet, May 14, 1910.

being, but that immunity is transitory, and the necessity arises for revaccination at an age approaching puberty. This author as well as Thomas Donnelly deplored the wave of antivaccination sentiment which was sweeping over Ireland, and advocated the education of the people by lectures in various centers throughout the country. McWeeny favored the glycerinated lymph in which the extraneous organisms had been destroyed and the local reaction mitigated.

The Relation of Animal Research to our Knowledge of Smallpox and Vaccination. Schamberg[8] concludes as follows:

1. Numerous experiments on calves have proved that smallpox virus may be converted into vaccine virus by transmission through several generations of the bovine species. This discovery not only establishes vaccination as a thoroughly scientific practice, but also provides for a new source of lymph in the event of the deterioration or loss of existing strains.

2. Experiments on calves have resulted in a method of calf vaccination which permits of the production of any needed quantity of virus. This renders unnecessary the use of humanized virus with the attendant disadvantages elsewhere referred to. The use of calves for the propagation of vaccine lymph constitutes the most important improvement in vaccination since its discovery over a hundred years ago.

Measles.

State Control. In an oration on State Medicine, after recounting the history of the movement for the conquest of contagious diseases, A. B. Moulton[9] notes the backwardness of communities to realize the danger from such common diseases as measles and whooping-cough. In only a few states and municipalities are any endeavors made to control these diseases, and where laws exist no penalties are attached to failure of physicians to report the diseases and very little restriction is enforced over the patient or contacts. Physicians even fail to estimate properly the danger in weakened states of the constitution, and the

(8) Jour. Am. Med. Assoc., Mar. 26, 1910.
(9) Penn. Med. Jour., June, 1910.

fact that these maladies often prepare the soil for the development of tuberculosis. Moulton says that the necessity for reports and for isolation and quarantine in such diseases as smallpox, diphtheria and scarlet fever is seldom questioned, but much opposition is encountered when we endeavor to extend preventive measures to the so-called minor contagious diseases. A large majority of the laity and a few of our profession, scoff at any law tending to control the spread of measles and whooping-cough, and when one speaks of placarding for chicken-pox or mumps it is met with a compassionate laugh. In many of these latter cases a physician is not called unless complications present themselves and then too frequently, as we all know, he is called too late to be of much service.

But when we take into consideration that in 1908, 1221 people died from measles and 1387 people died from whooping-cough, the deaths for each of these two diseases being in excess of those from scarlet fever and the deaths from whooping-cough almost equalling the deaths from diphtheria, the wisdom of the rules and regulations enforced by the department of health until the recent act was passed by the legislators at their last session, becomes apparent. With the law as it exists in our statute books enforced, we would see a very marked decrease in the death rate for all communicable diseases, but unfortunately the spirit of selfishness has not entirely died out, and those who are inconvenienced by any of its provisions rebel, and those who have passed through the siege are in too many instances indifferent to the fate of others who may fall victims to these diseases.

Diphtheria.

Quarantine. The following directions are given by Wm. M. Welch[1] as to quarantine measures for diphtheria. It is hardly necessary to say that the patient should be separated from the well members of the household as soon as the nature of the disease is known or even suspected. This is important even when the attack is mild, as severe and fatal cases may result from mild ones. If the patient must be treated at home, a room on the top floor of the house should be selected and the windows screened. It should

(1) Penn. Med. Jour., June, 1910.

contain no unnecessary furniture nor hangings, and it should be well ventilated. There should extend across the entire doorway on the outside of the door a sheet that is kept constantly moistened with a disinfecting solution. Isolation of both the patient and the nurse, as well as the sterilization of all infected articles, must be perfect if the best sanitary results are to be expected. These directions are applicable to all communicable diseases.

Diphtheria Bacillus-Carriers. The difficulty of eradicating diphtheria by eliminating diphtheria-carriers is shown by an investigation carried on by F. H. Slack, B. L. Arms, E. M. Wade, and W. S. Blanchard[2] in the public schools of Brighton, a suburb of Boston. They reach the following conclusions:

1. At least 1 per cent. of all healthy school children are carriers of morphologically typical diphtheria bacilli (Wesbrook's A, C and D types).

2. Such bacilli are communicable from one person to another and the condition is usually a transient one.

3. The organisms are ordinarily of little or no virulence.

4. While it is possible that by passing through a susceptible individual their virulence might be raised to cause the disease, this is not a frequent occurrence.

5. The disease diphtheria is kept alive in a community rather by virulent organisms in immune persons than by these non-virulent bacilli.

6. Where virulent diphtheria bacilli are present, as shown by outbreaks of the disease, cultural tests of all contacts and isolation of those showing positive cultures is a duty owed to the community.

7. Where the disease does not exist, isolation of carriers of probable non-virulent bacilli is of no proved benefit, and is a costly and laborious procedure entailing much unnecessary hardship on innocent and probably harmless parties.

8. The attempt to control diphtheria in a city by a round of cultures from all school children at the beginning of the school year does not seem encouraging from this series of tests.

9. The proposition to stamp diphtheria out of a city

(2) Jour. Am. Med. Assoc., Mar. 19, 1910.

by cultural tests of all the inhabitants and isolation of all carriers is impossible from any practical standpoint.

Scarlet Fever.

Etiology. J. F. Schamberg[3] concludes that the infecting organism of scarlet fever is still unknown, although streptococci are intimately associated with many of the lesions of the disease, as they are with those of smallpox. Subsequent investigation may show that a special strain of streptococcus is the cause of scarlet fever, but at present it seems more probable that the disease lessens the resisting power of the system against these organisms as against other germs, and that they take the opportunity to proliferate and produce many complications. There is a natural immunity to the disease in certain individuals and also an acquired immunity which becomes more marked with advancing age without actual experience of the disease. The immunity varies to some extent and this accounts for the fact that nurses and others who have shown themselves immune for a long time may afterwards take the disease.

Three circumstances appear to increase susceptibility to the affection. The first is burns, and Schamberg gives it as his opinion that most of the scarlatinal rashes occurring after burns are examples of true scarlatina. This fact he thinks physicians have been slow to recognize. It is in his opinion unsafe to treat a "burn case" with a rash in a general hospital ward with other patients. Every such patient should be isolated. The diagnosis should not be denied because the patient fails to present the other symptoms of scarlet fever. Burns seem specifically to lower the resisting power of the system against the infective agent of this disease. The puerperal state also lowers resisting power and favors infection. This is not due in the opinion of the author to absorption of the infecting agent through the burned surface or the puerperal wound. The disease is apt to follow surgical procedures especially about the throat and nose. Not all rashes occurring after such operations or in the puerperium are scarlatinous. Some cases are due to septic poisoning. The fact that cases occur in such circumstances without known contact indicates that some persons may carry the germs in the throat without

(3) Penn. Med. Jour., June, 1910.

harm to themselves until a lowered resistance makes infection possible. This suggests the idea that a number of persons may be scarlet fever-carriers after the manner of typhoid fever-carriers and may account for cases in which there is no history of contagion.

Schamberg raises the question of the contagious character of the scales desquamated from the skin. From time to time articles by men of authority and large experience have been published, challenging the doctrine of the infectivity of the desquamating epithelium in scarlet fever. Nevertheless, the teaching in the medical schools has adhered tenaciously to tradition in regard to this question; and students and practicing physicians appear to be thoroughly imbued with the old doctrine.

Let us consider the available evidence on the question of the infectivity or non-infectivity of desquamating epithelium in scarlet fever. As was pointed out in 1902, in a thoughtful article by Millard, published in the *Lancet* of April 5, there is lack of direct evidence that the scarlet fever infection resides in the scales. Millard obtained the opinions of a considerable number of experts who could adduce no evidence that desquamating epithelium *per se* was a source of infection. Experimental inoculation with scarlet fever scales have been so conflicting in their results as to be entirely untrustworthy. There do not appear to be at hand any clinical facts which definitely prove the thrown-off cutaneous scales to contain the causative agent of the disease. On the other hand there is ample evidence that the *contagium vivum* is not exclusively present in the desquamating epithelium, for scarlet fever is contagious before the beginning of scaling and may continue so for weeks after the cessation thereof. There are other considerations which strongly militate against the view that the infection resides at all in the exfoliated scales.

The general experience of scarlet fever hospitals is that there is no increased danger to persons living in the neighborhood of such institutions by reason of the atmospheric transmission of particulate dust carrying infection of the disease. When we contrast the experience of scarlet fever hospitals with that of smallpox hospitals a striking difference is noted. It is pretty generally agreed that a large smallpox hospital is a danger to the surrounding communi-

ty because of the infection-carrying properties of air currents. We know positively that smallpox crusts contain the exciting cause of variola for we can inoculate the disease with the desiccated crust. The air in the wards of a crowded scarlet fever hospital contains innumerable particles of skin epithelium in varying states of division. This is evident to any one who is familiar with the conditions in such wards. Upon the floor around the bed of a profusely desquamating patient are seen masses of scales. These are partially pulverized by attrition and wafted into the air. If the scales of scarlet fever were infectious, we should find, reasoning by analogy with smallpox, an increased incidence of scarlet fever in the environs of scarlet fever hospitals. The experience of the London Hospitals, of the Boston City Hospital, and of the Philadelphia Municipal Hospital is in accord with the general observation that such is not the case.

Millard says: "The principal argument in favor of the view that desquamation is infectious is the fact that patients still desquamating but otherwise free from infection have frequently been known to convey the disease to others. The whole force of this argument disappears, however, when we consider that patients apparently quite free from infection and in whom desquamation has entirely ceased have also been known to convey the disease. Moreover, patients still desquamating have frequently mixed freely with others without untoward result."

If the infection does not reside in the skin, where is its habitat? General clinical experience would point to the secretions of the nose, ears, and throat as the lurking places of the scarlet fever infection. Schamberg cites the experiments of Stickler and Aaser as sustaining this idea. The latter author contends that patients should not be dismissed from isolation until careful examination of the throat and nose shows that the secretions have ceased, even if the time required is twice that of the ordinary period of isolation. The subjects are liable to infect others as long as the infecting agent lingers in the nose, throat or middle ear. Its presence is disclosed by the abnormal secretion which the writer determines with hydrogen peroxid.

The question is commonly asked, How long are scarlatinal patients to be isolated? This question can not be

categorically answered. In no disease is it so difficult to affirm that the danger of infection is passed. Cases must be treated in this respect upon their individual merits. The opinion prevails too largely that scarlatinal infectivity no longer exists when desquamation has ceased. It has not been a bad working rule to regard the termination of desquamation as the minimum boundary of the isolation period, but it is dangerous to view the scaling as the crucial test of infectivity. Furthermore, concentration of attention upon the cutaneous scales, as the essential infecting material, has obscured the comprehension of the real sources of infection.

In the Municipal Hospital of Philadelphia patients have been known after discharge from the institution to transmit scarlet fever to others as long as sixty-three days, seventy-four days, and in two instances four months after the onset of the disease. All of these patients had long since ceased to desquamate, but several of them had suffered from aural discharge prior to their leaving the hospital.

Schamberg concludes that the time has come when students should be taught that the desquamating epithelium of scarlet fever is not to be regarded as the criterion on which to determine whether the patient shall be longer isolated or not; that the infection resides in the pharyngeal, nasal, and aural secretions, and that scarlatinal patients with discharges from these cavities must be isolated until such discharges cease.

Isolation. F. G. Crookshank[4] lays down as the first principle in the control of scarlet fever isolation in a suitable hospital. In large communities the isolation hospital should have separate wards for the different diseases and for the two sexes, as well as divisions for separating the doubtful and convalescent cases. In smaller communities this division into wards is impracticable, but it is possible to effect as perfect isolation by means of surgical aseptic technic as can be secured by ordinary means in the hospital with different wards, the patients still being kept in the same ward. For this purpose strict control must be maintained over nurses and patients and the space allotted to the individual patient must not be less than would be given adults in a well-conducted surgical ward.

(4) Lancet, Feb. 19, 1910.

Every patient should be kept in bed at least three weeks, and for the first few days after leaving the bed should recline on a lounge separated by a few feet from others. On admission each patient should be given a complete outfit kept in his locker, consisting of a porcelain tray, kidney bowl, spitting mug, receiver, spray or syringe, thermometer in glass vase, glass spatula and toothbrush in glass vase, feeder, medicine glass, brush and comb, and other articles. These are all kept during the whole illness for the patient's exclusive use, and are frequently sterilized by appropriate methods, being, of course, again sterilized or, if necessary, destroyed at the end of the illness. The spatula, thermometer and toothbrush are kept continuously in izal solution, and the same substance shaken up with water or paroleine is used for spraying, syringing, or douching the mouth, nose, etc., every four hours during the first week, and three times a day later. No nurse passes from one prime infection to another without first disinfecting her hands and donning a special ward overall kept for the purpose, and, of course, disinfecting her hands afterwards. Certain cases of doubtful nature and special or mixed cases are marked by a warning tab affixed to the bed card, and for each of these cases a special overall is used. In addition to the washing of the hands required from everyone on leaving a ward, disinfection for each case is required and made easy by the placing of a stand with solution, towel, etc., at the foot of each "special" bed, or between the beds of each two or three simple cases, while rubber gloves are used in dressing wounds or attending to puerperal cases. All this means little trouble really, and is amply repaid by the knowledge that security is obtained thereby. The system can be further elaborated, but, of course, in a small place one has to go slowly and acquire material by degrees. The application of this method in the author's practice has shown excellent results.

Tropical Diseases.

Etiology. J. H. Egbert[5] describes the diseases prevailing in tropical Central America. Calentura, a fever of malarial type, prevails both in the mountains and the lowlands and is found in districts where the *Anopheles* is never

(5) N. Y. Med. Jour., Oct. 23, 1909.

found. The author regards it as an infection in which the *Plasmodium malariæ* may often be found in the blood, but which is almost invariably associated with and has as its exciting cause lumbricoid worms which are often vomited in large numbers during the chill. Amebic dysentery, gonorrhea and smallpox, are prevalent. The author answers according to his viewpoint the question why are the natives of the uplands as well as of the lowlands, unhealthy and generally sick? Because they are almost universally unclean and disobedient to every principle of hygiene. They are dirty of body, seldom bathing hands, feet, or face. They live in filth, corralled together with vile pigs, forlorn cats, and mangy dogs. They seldom clean their places of abode or really cleanse untensils used for the preparation or serving of food. With many, the hands—practically always unwashed—often serve as knife, fork, and spoon, while any old thing serves as plate and table. Is it therefore strange that intestinal parasites are ever present among them, and that disease, once established, is most difficult to eradicate?

Poliomyelitis.

At the twenty-seventh German Congress of Internal Medicine M. Krause[6] reviewed an epidemic of infantile paralysis, and described the features of the disease as recently prevailing in Rhenish Prussia. From the epidemiologic point of view it must be regarded as an infectious disease. The contagion is direct and may be transmitted to the ape and to the rabbit. Infection often takes place without the subject's notice. In one case it resulted from the patient staying in a room which had formerly been co-occupied by a sick child. The disease especially affects infants from one to two years, but adults may also be attacked. A very curious fact, worth pointing out, is that during this epidemic Krause observed a disease of chickens which produced similar paralyses. In French literature there is found recorded a case of a cock which presented the symptoms of an acute poliomyelitis. A number of rabbits also have perished as a result of an analogous disease.

According to Römer the virus is not easy to stain or cultivate. It resembles much more the virus of rabies. It cannot be cultivated with certainty *in vivo* except in the

(6) Sem. Méd., May 4, 1910.

ape, and it may be filtered and is very sensitive to high temperatures. The lymphatic system of the respiratory and digestive tracts forms the port of entry of the virus, but these organs are also places of elimination. It is therefore necessary to subject to disinfection all objects which have been in contact with infected subjects. It is possible to immunize apes against the disease, and their serum then contains specific antibodies.

Pellagra.

Etiology. D. R. Silver[7] regards the following propositions as accurately true: 1. Where corn is not eaten pellagra does not exist. 2. The eating of good corn or corn-meal will not produce pellagra. The danger is from inferior or spoiled corn which is likely to be sold to the poor at a low price. He presents evidence that much spoiled corn is dried, ground, and mixed with good corn-meal, and the mixture shipped to the South where it is sold to the poor at reduced rates.

Trachoma.

The danger of the spread of trachoma is pointed out by C. P. Franklin.[8] The example of European countries where the disease has become epidemic, in places causing the closing of schools, should be a sufficient warning to this country not to trifle with so serious an affection.

Trachoma within our borders, at present either ignored or lightly held, with no adequate means for its isolation or elimination, will prove a growing menace. Cases are being found in a little higher social stratum from time to time, creeping up insidiously, until, originally a filth disease of the poor, it will appear amongst our highest and best, and do damage upon human machinery highly important to the working of the state.

Taken now, the question of the control and elimination of trachoma is only a question of comparatively minor expense to the state, but, as it develops in higher social circles, its danger to the safety of the commonwealth increases in geometric proportion, and it will eventually, if unchecked, force the annual sequestration of a share of our

(7) Jour. Am. Med. Assoc., Feb. 5, 1910.
(8) Penn. Med. Jour., June, 1910.

public funds that will seriously interfere with the proper maintenance of far more important public works.

Franklin has found by tracing cases which came to his clinic to their source that there were many other cases unrecognized, and that the number might be multiplied indefinitely by the experience of other clinics.

The national government has been awake to the importance of means of control of trachoma since 1897, when the new immigration law was passed. Reports sent to Franklin from the medical headquarters of the army and navy show that trachoma now rarely occurs in those departments, while the last report of the United States Public Health and Marine Hospital Service shows that last year, in four treaty ports alone, 6,400 cases of trachoma were debarred from embarking for this country, while 2,608 cases of trachoma were debarred from landing at the various points of entry into the United States, and 10 aliens were deported within three years after landing, according to law, having developed trachoma. More energetic measures based on better legislation and an aroused public sentiment are needed to avert the danger.

Venereal Diseases.

Frequency. The effect of venereal diseases on the public health is discussed by E. L. Keyes[9] and an attempt made by him to estimate the frequency of these diseases. It is generally agreed that gonorrhea is very prevalent in large cities and much less prevalent in the smaller cities and in the country districts. From German sources estimates are obtained varying from the conservative view of Erb that 40 per cent. of young men have gonorrhea to the estimate of Blaschko who places the figure at 80 per cent. of the young men living in the large German cities. In this country Morrow estimates that 60 per cent. of the adult male population of the United States have gonorrhea, while Forschheimer places the proportion at 51 per cent. The proportion of cases among women is placed at 1 to 16 of those among men. Keyes expresses the view that the gonococcus disappears from the male urethra in 18 months and practically always within 3 years, but no such period

(9) N. Y. Med. Jour., Jan. 1, 1910.

can be given within which it will cease to be infectious in women. He says:

"One may thus sum up the infectiousness of venereal disease by stating that gonorrhea is extremely infectious for six months in the male, for an indefinite period in the female, syphilis for eighteen months in either; that infectiousness ceases for gonorrhea usually in the first year or eighteen months for the male and always within three years; but the possibility of infectiousness in the female remains indefinite, while syphilis ceases to be infectious after five years by contact, whether from man to woman, or woman to man, but may remain infectious for at least five years longer from the mother to the unborn child.

"The prevention of venereal disease may be undertaken in five different ways: By personal care and antisepsis after exposure, by segregation of prostitutes, by making venereal disease reportable to the health authorities, by the so-called educational prophylaxis, and finally by that humble and useful prerogative of the physician, curing the sick. Adequate discussion on these topics is no less appalling in its magnitude than adequate discussion of the gravity of these diseases. Of personal prophylaxis, either by injection of protargol or other antiseptics against gonorrhea, or by inunctions with Metchnikoff's calomel ointment against syphilis, we can only say that each one of them has been proved not to be infallible. A certain measure of safety resides in each, but this measure of safety is doubtless overbalanced by the unwarranted excesses which the use of these preventive measures encourages in the victim. The timid are made bold, the bold are made reckless, the reckless become infected. In only one sphere have these measures proved surely useful, *viz.*, in the army and navy, where the enlisted men can be instructed to report immediately for prophylactic treatment after any lapses. Such treatment has apparently proved efficacious in reducing the prevalence of venereal disease in both services.

"Segregation of prostitutes we can speak even less well of. The subject is of course still open for discussion, and yet after more than a generation of most careful police regulation both in France and Germany, segregation has failed to establish itself as a sound method of preventing venereal disease. The reasons for this are, briefly, that

segregation does not segregate the infectious male, that it does not segregate the most dangerous female amateur prostitute; and finally that the medical certificate, which results from a hasty examination made once a week or so by a government official, is small prevention in the case of a woman who is likely to be exposed to contagion at least four or five times a day before the next inspector comes around. The only country in which segregation is supposed to have proved effective is Japan; elsewhere the best that its adherents can say for it, is that, perhaps like personal prophylaxis, it is useful in protecting the health of the army and navy.

"The campaign to make venereal diseases reportable is apparently threatening to take on a serious aspect in this country. Yet while human nature remains what it is, it is difficult to see how any of the various methods that have been devised to conceal the patient's identity under this system should be practically effective. Obviously if the regular practitioner is known to report venereal diseases to the health authorities, the irregular practitioner will not be slow to advertise this fact, and reap therefrom his harvest. No man is anxious to figure as a gonorrheic or a syphilitic in the statistics of the community, even if his be only a number and not a name. Moreover, if the reporting of venereal disease is surrounded by every precaution to conceal the identity of the patient (an obvious necessity), what results are we to expect from such reports, excepting from that portion of the population whose imagination is not already cloyed with statistics concerning the enormities of the beef trust, or the wealth and iniquities of our millionaires?"

Keyes is most enthusiastic concerning results that may be expected to follow from the diffusion throughout the community of the knowledge that sexual irregularities result not only in physical and moral degradation but also in disease. We may not expect thereby to abolish the lust of men or the frailty of women. But we may hope to unmask the brute vices that imitate these fundamental weaknesses. Our children, our shop girls, our factory operatives, whether young men or young women, assuredly have a right to some sexual education other than that which they may obtain from the gutter.

Duty of the Physician. A. L. Wohlbarst[1] deplores the indifference with which some general practitioners regard the venereal diseases. This arises from several causes. Some physicians have a natural dislike to this field of medicine and hence give it little attention, others do not appreciate the importance of these diseases, but get rid of them as easily as possible; but in the author's opinion the greatest hindrance is the idea that there is something shameful or criminal in being affected with a venereal disease. Such an attitude can have only a vicious effect on the physician, the patient and the public. Venereal disease should receive the same careful attention as any other infectious disease and the fact that it has been acquired in immoral ways should make no difference to the physician whose sole aim it should be to cut short its course before it becomes general and spreads its contagion through the community. The physician who has a case of gonorrhea under his care has an opportunity not only to prevent the spread of the disease in the community, but also to assist in the preservation of the general health by preventing the development of its more serious phases in the individual case. This is shown by the consequences of such complications as gonorrheal epididymitis, which may entail sterility, or arthritis which may cause most important general disease.

Government Control. L. Lichfield[2] describes the plans for government control in European cities and concludes: "Any attempt at police control of prostitution without the European system of registration of all inhabitants with compulsory notification of all changes of residence, occupation, etc., would be futile, and therefore, police control of prostitution is impracticable for our American cities." The author advocates the organization from our present local societies of an American Association for the Prevention of Social Diseases, with branches and dispensaries in all our cities.

P. K Flannagan[3] contrasts the Hebrew care regarding venereal disease which required publicity and minute precautions to avoid contagion with the modern attitude of indifference which forbids all reference to such diseases,

(1) Am. Med., May, 1910.
(2) Jour. Am. Med. Assoc., Feb. 26, 1910.
(3) Gaillard's South. Med., January, 1910.

covering them with the mantle of the Hippocratic oath even though it entails the sacrifice of innocent women and children. He contends that the Hippocratic oath does not properly apply to these cases since such persons have voluntarily smirched their own characters. Such cases ought to be made public if necessary for the protection of the public health. In his judgment it is time for the profession to put itself on record as in favor of health department supervision of syphilis and gonorrhea.

Sex Instruction. R. K. Flannagan[4] regards instruction of children in sexual hygiene as a necessary part of their education which will give boys that proper respect for themselves and for their own virginity that is deemed so necessary for their sisters and will ensure a knowledge of the consequences of unchastity, a knowledge usually acquired too late. In his view it is the duty of the doctor to preach purity, to insist that it is no more necessary for a man to be impure than for a woman, and that a man's loose conduct in this regard is the result of habits formed in youth. Physicians should be missionaries to open the eyes of the young to the sacredness of the function of reproduction, and to inculcate the principles of continence and virtue at the most impressionable age.

GENERAL SANITATION.

Hygiene of the City Dweller. S. A. Knopf[5] discusses the improving of the hygiene of the city dweller. Under the heading of general and outdoor hygiene he first proposes that by the co-operation of federal and state authorities the community shall be protected from the importation of epidemic diseases. Plenty of pure water should be supplied by municipal authorities to the public in the streets by sanitary drinking fountains. Soda water fountains should be supervised so as to secure greater attention to the cleanliness of utensils. Public toilet facilities should be provided. Public urinals can be placed behind shrubbery or concealed in other ways so as not to offend. Bathing facilities should be found in every house, and public swimming-pools should be provided. The streets should be sprinkled at public expense, and the air should be re-

(4) Gaillard's South. Med., January, 1910.
(5) Med. Rec., Jan. 8, 1910.

newed and purified by sufficient movement by the wind or in some other way. The smoke nuisance should be removed, and the street noises should be moderated. The streets should be efficiently cleaned, and garbage should be removed in covered wagons. Rigid inspection of food and milk should be enforced. Flies and other noxious insects should be exterminated.

The author believes that the excessive use and abuse of alcohol is responsible for more crime and disease than any other cause, but he questions the wisdom of absolute prohibition in the present state of our civilization. As remedies for the evil he suggests the discouragement of the treating habit, temperance pledges, better hygiene and better cooking at home, healthful amusements and decent resorts where the workingman can take his family, etc.

Indoor hygiene demands sanitary workshops and sanitary dwellings that can be rented at moderate rates to the workingman, proper methods of sweeping, provision for sleeping in plenty of air, suitable toilet rooms, etc.

The author thinks that the seats of water closets are as a rule too high so that they necessitate an improper attitude that leads to imperfect emptying of the bowels. He advises covering the seat with a piece of paper to prevent infection.

"As far as family and personal hygiene is concerned, we must look for our salvation to public education through schools, the right kind of lectures, popular literature, and above all to the teachings of medical men and women.

"The city dweller should know how to dress. When one has seen in hospital work in the city of New York an individual brought in suffering from sunstroke, and on being undressed he was found to have three flannel shirts under his waistcoat and coat, one realizes the need of education in this respect. The ignorant citizen should be taught, and the knowing permitted to dress according to weather and season. If I am rightly informed, our higher postal authorities do not allow the letter carriers to go without a coat even in the hottest weather. Last summer, on one of the hottest days of the hot season I saw a gentleman enter a fashionable restaurant in white negligée shirt and belt looking neatly dressed, and one would have thought properly for the season. He was refused the cooling drink

he asked for because he had no coat on. It was in the evening. There were ladies present with no hats, in cool decolleté summer dresses, decolleté in front and behind, with no sleeves, some with shirt waists of the thinnest material, some of material largely fenestrated—all were admitted and served, but the man had to go thirsty until he could cover—not his nakedness, but his nice, clean white shirt which covered his arms to his wrists and his neck to his ears. It is an absurd custom that men should not be allowed to dress as coolly as women. Except in cold weather, I consider the stiff linen dress shirt uncomfortable and unhygienic and the stiff tight and high collar for man and woman unhygienic all the time. The turned-down or soft collar should be made more universal for ordinary use. The negligée shirt is far superior to the others.

"The derby hat, such a prominent feature of city life, which, when worn a long time, constricts the circulation of the head and is doubtless the cause of much baldness, should be replaced by the more hygienic soft felt hat. To wear the hat indoors, which is also the habit of so many business and laboring men, is a habit which cannot too severely be condemned from a hygienic point of view."

Ventilation.

W. A. Evans[6] classifies the factors of poor ventilation into quick-acting and slow-acting. The former he names in the order of their importance as follows:

1, Bacteria; 2, dust; 3, temperature; 4, humidity; 5, odors; 6, CO; 7, organic matters; 8, CO_2. The resulting diseases are consumption, pneumonia, bronchitis, colds, influenza, cerebrospinal meningitis, anterior poliomyelitis, smallpox, diphtheria, and scarlet fever; all of these are infections which are air-borne; the gas poisonings are also air-borne. Of these influenza, colds, bronchitis, cerebrospinal meningitis and anterior poliomyelitis can be carried some distance by the air; smallpox not so far, while consumption, pneumonia, diphtheria, scarlet fever, and gas poisoning extend only a few feet.

The slow-acting harmful agents Evans would also name in the order of their importance: 1, Heat; 2, humidity; 3, organic matter; 4, CO_2; 5, odors; 6, bacteria; 7, dust;

(6) Med. Rec., May 21, 1910.

8, CO. The diseases caused by these are anemias, headaches, drowsiness, constipation, and the slow group following in the wake of these. This group is of additional consequence in that its causes at times determine infections.

As to humidity: A dry-house air is not so harmful to health as has been held. The uncomfortable feeling, say of apartment air, is due to the air being too warm for comfort rather than too dry. Humidifiers and sprinklers for moistening the incoming air are, as the French say, *"inutiles."* Air which is offensive may not be harmful. Temperature is the most important factor affecting the harmfulness of confined air. If the temperature is over 70° F. it favors the decomposition of organic matter.

The author sums up his principles of ventilation in the following propositions:

1. Attention must be concentrated on the breathing zones of the habitually occupied portions of the room. This in the average room means a space of from 4 feet above the floor level to 6½ feet above it.

2. In this zone there must be the greatest possible effort to prevent stagnation and dilution.

3. Dead zones and corner eddies must be encouraged as settling places for bacteria. In them there must be the smallest possible air movement. Such spaces must be cleaned daily with moist methods. Therefore, they must be readily accessible for cleaning purposes. Such zones must be unoccupied. If such nooks are occupied, *e. g.* a working desk is placed therein, conducting ducts with air inlets must be made to open into them. Ventilation of such crannies by dilution is a myth.

4. The breathing zone must be occupied by an even upcurrent of air, moving at the rate of at least 60 feet a minute from multiple floor inlets to multiple ceiling outlets. If the natural upward-flow is met by a down-flow of air, the expired air is buttressed right in the head zone and does its maximum harm.

5. The ventilating air in mechanical systems should never enter the room at more than 40° below body temperature; 30° below is better still. Where men are working hard, a high temperature, say 70° F., is required on account of the chilling of perspiration. Where men are very still and sluggish, a room temperature of 68° to 70° F. is re-

quired. Where men are mildly active, 60° to 65° F. is better.

6. The air must be protected from dust—both the introduction of dust from the outside and the dissemination of dust produced inside.

7. It is of great importance that the relative humidity of the inside air should not be materially greater than that of the outside air. It is of some importance that it should not be more than 10 degrees less than the outside air.

8. The volume of air per quiet person per hour should be around 500 cubic feet, varying with the directness of removal of the polluted air.

9. The arrangement of the ventilation must be such that the windows can be opened and the room blown out at least once in each 24 hours.

10. Recirculation of air is not to be tolerated.

11. The air must be below 6 parts per 10,000 in CO_2, and low in dust and bacterial content.

The School Child.

The Child's Health. From an investigation of the conditions surrounding the school child by J. W. Van Derslice[7] it appears that inefficiency exists in the working out of the educational method for the child in all departments. The curriculum is overcrowded, not enough allowance is made for the lacking powers of attention in the lower grades, ventilation is often insufficient, toilet facilities unsatisfactory, and many unsanitary conditions exist. The author suggests the establishment of an educational health board connected with each school system, this board to be composed of physicians, with proper authority to act in safeguarding the health of the school child, and to be the final arbiter in regard to hygiene and sanitation and to indicate the mental and physical ability of the pupil.

The Child's Breakfast. The statements of Hunter and of Spargo indicating that a large number of school children go to school with no breakfast or insufficiently fed led W. C. Holopeter[8] to investigate the subject from a more scientific, but less sensational standpoint. The teacher was to ask confidentially of the child three questions: Do you

(7) Jour. Am. Med. Assoc., Nov. 20, 1909.
(8) Jour. Am. Med. Assoc., Nov. 20, 1909.

eat breakfast, what do you eat, and how long does it take you to eat? The answers showed that of 2,169 children only 6 claimed to eat no breakfast, the majority took from 15 to 20 minutes to eat and the food was generally sufficient, but the reason for insufficient nourishment lay in lack of appetite due to faulty hygienic or constitutional conditions. The author recommends that physicians give the families under their charge definite instructions for the correction of poor home surroundings of the child as to sleeping-rooms, personal habits, and the character of food and the proper way of eating.

Homes of School Children. J. Sobel[9] calls attention to the influence of home conditions on the school, and shows how the ignorance and prejudices of the foreign population of the tenement district, together with the unfavorable influences due to the construction of the houses themselves, often with insufficient light and air and with insufficient opportunities for the proper privacy of family life, hamper the work of the school and the efforts made for sanitary improvement.

In the tenements the following classes have to be dealt with:

1. *The Ignorant.* Ignorant not only as to the purpose of the physical examinations but ignorant as to all those factors which are necessary to the health and welfare of the child.

2. *The Distrustful.* A class which in its native land has been subjected to so much suffering through treachery, that it is suspicious of every inquiry on the part of an official or any encroachment upon its private life.

3. *The Apprehensive.* Many parents are willing and able to have the defects remedied but when operative measures are suggested, fear immediately takes possession of them. It is fear not only for the consequences of the operation but of the pain which the child might experience.

4. *The Indifferent.* There are some who are so disbelieving as to render it difficult to arouse them to a sense of parental responsibility; they seem to be possessed of an indifference and inertia from which it is not easy to awaken them.

5. *The Non-progressive.* Some there are so narrow

(9) N. Y. Med. Jour., June 4, 1910.

minded—and this applies to a certain extent to the better element—as to reason that they grew up without medical school inspection and that, therefore, their children must do the same.

6. *The Poverty Stricken.* This includes those whose income is so small as to prove insufficient for their daily needs, and who are compelled to sacrifice home conditions and the care of their children by seeking and resorting to outside employment. It might also embrace those whose income though small might be put to better advantage if more wisely distributed.

7. *The Superstitious.* These are so imbued with prejudice, traditions, and customs that they hesitate to expose the child to the supposed dangers from the after consequences of operative interference.

8. *The Unstable.* Parents with so little stamina that they fall back on the statement: "The child don't want to," in order to cover up their own weakness.

9. *The Shiftless.* A class so devoid of character—intemperate, irresponsible, unsympathetic—that they not only withhold from the child that which is his by right, but they compel him to engage in occupations, criminal or otherwise, which bring to them financial returns. It is the class which Bert Hall, of Milwaukee, refers to as "Adult truants—men who 'lag' from their duty, women who shirk and have but the faintest conception of, and no training for, life's most sacred duties."

10. *The Antagonistic.* The number of parents who absolutely refuse to do anything is very small, in all about three and one half per cent.

One of the most important considerations is vision. Two problems present themselves here: 1. How to persuade parents who are able to provide glasses to procure them for the children. 2. How to procure eye-glasses *gratis* for those who are absolutely unable to pay. The author estimates the percentage of defective vision at 30, and of these he estimates that not more than 1/12 are too poor to pay. He thinks that the latter problem could be solved quite easily by suitable philanthropic efforts. He sums up the question of defective vision as follows:

1. The number of parents actually unable to pay anything toward glasses is relatively small.

2. Many of those asserting inability to pay for glasses are able to do so in one or several payments, as close investigation shows.

3. Those that pay for them usually take better care of the glasses than when they are paid for by outside sources.

4. Experiences of the principals and nurses bear out the truth of the statement that the vast majority of the people of the tenement can be trusted to pay.

5. Opposition to the wearing of glasses on the part of parents and pupils is a phase of thought not dealt with easily.

6. A central fund for the entire city established by philanthropic bodies or individuals would need an amount not prohibitive, and the actual outlay without return during any given year would probably not exceed $5,000. Such a fund properly organized with district branches would enlist the co-operation of many public spirited citizens.

In the education of the mothers the author thinks there is great reason to believe that the future of the school child will be solved. He says: A kind word, a confidential manner, an evident interest in the child, gentle suasion, explanation of the effects of the condition and the benefits of treatment, *with special emphasis upon the fact that removal of the defect will increase the child's future wage-earning capacity, a plain heart-to-heart talk in their native tongue*—therein lies the hope of parental co-operation these days.

Dentistry. S. W. Newmayer[1] says that during the past year health officers, physicians, teachers and educators have been having hysteria over the existence of carious teeth among school children. It has been reported that carious teeth are to be found in from 50 to 75 per cent. of the pupils. If these same children had been examined by trained graduate dentists there would be shown to exist 90 to 95 per cent. of cases requiring treatment. There are also various degrees and varieties of stomatitis and sometimes deep ulceration. The knowledge of the existence of some of these abnormalities is extremely important to school authorities because they explain in some cases the hidden cause of an abnormal child. Carious teeth may merely produce discomfort, but the irregular deformed jaws

(1) N. Y. Med. Jour., Mar. 5, 1910.

and absence of several front teeth are causes of defective speech. Other abnormalities such as cleft palate or unmistakable signs of syphilis may explain the hopelessness of making a normally mental child.

The author calls attention to the fact that the temporary teeth must decay, fall out, or be extracted before the permanent teeth come in. These teeth were not made for permanent fillings, although it is a great advantage to have the teeth last until it is time for the permanent teeth to erupt so as to secure regularity. School children between 5 and 15 will naturally have decayed teeth. What can the dentist accomplish with these cases except to extract an annoying tooth? Every mother knows this and that is why she does not bother with the child's teeth. The author shows that it is impossible for the dental clinic to treat thoroughly the cases needing attention. The sign-posts of these facts point to the right road: Teach the hygiene of the mouth. The only available and practical course which can be of value in saving the temporary teeth, until they are replaced by the permanent and to insure healthy teeth in future years, is to teach to all school children a few simple rules on the care of the mouth and the teeth.

Use a tooth-brush daily or more often.

Use a simple antiseptic mouth-wash frequently, especially after meals and at bedtime. This need not be one of the expensive advertised mouth-washes as plain lime-water is effective.

Don't misuse the teeth by biting nuts and other hard substances.

Don't pick the teeth with a penknife or any sharp instrument.

Go to a dentist at least once a year whether you have a pain or not.

Health in Factories.

Sanitary Supervision. W. C. Hanson[2] pleads for the sanitary supervision of young persons in factories in a manner like that in which they are cared for in schools. The medical inspectors are enabled to give a great deal of good advice, but they lack in many cases proper facilities for their work, especially when a physical examination of

(2) Boston Med. and Surg. Jour., Mar. 10, 1910.

some of the employées is called for. Moreover, they lack the power to exclude children from factory work on account of ill-health or physical unfitness, and parents often pay little attention to their recommendations.

In the school, when such affections as pediculosis, scabies, blepharitis, trachoma, etc., are detected, they are vigorously excluded until remedied. Why not in the factory? In the school, each child's sight and hearing are tested annually. Why are not the sight and hearing of each young person in a factory tested annually and a judgment formed for each child based on the kind of work done and the conditions under which the work is done? Why should not the children in factories receive not only as great but greater attention than those in our schools, when many of the factory children are exposed to influences which are far more inimical to health than the conditions to which school children are subjected in schoolrooms, and for longer daily periods?

Athletics.

Use and Abuse. T. M. Burn-Murdock[3] discusses the use and possible abuse of athletics. He says that the importance of regular gymnastics along with more strenuous athletic exercises cannot be overestimated, and should always be attended to at school. Referring to intellectual advantages he finds that the athletes usually belong to the best class intellectually. Several headmasters and medical officers of schools to whom he has spoken concur in the opinion that their best boys intellectually are frequently those who excel in manly exercises and are well developed both in mind and body. The moral effect is excellent in developing unselfishness, co-operation and endurance. Purity in school life is the prime object, and without all the various forms of athletics it would be an impossible task to keep the tone of a school pure. The author states that while aware that athletic boys may have bad habits, such boys are in his judgment exceptional.

The dangers of accidents, overstrain, etc., are discussed and the following recommendations made to assist in lessening possible abuse: 1. Medical examination of boys and girls which ensures the detection of defects. 2. Their

(3) Edinburgh Med. Jour., May, 1910.

classification for exercise. Physical ability should form the basis of classification. 3. Proper clothing; strict rules as to changing and drying of clothes should be enforced. 4. Relation of exercises to meal hours; hard exercise should never be taken for at least an hour after meals. 5. Special care should be taken as to resumption of exercise after illness. 6. Supervision of exercises by game-masters and carefully selected school captains and prefects. 7. The author especially advises military training, and distance and cross-country runs.

Medical Supervision. The necessity of medical supervision of school athletics is pointed out by N. B. Potter and J. T. Harrington.[4] They examined 52 boys from various schools and 6 Columbia freshmen, and found in a number of cases enlargement of the heart and albumin and casts in the urine. The boys were examined after running a mile and generally a rapid pulse and a lowered blood-pressure were found. They believe that competition in games is unwise for many boys, and that it should be allowed only under careful medical supervision.

Training of Teachers in Hygiene. An outline of the course of training given to teachers at the Edinburgh Provincial Training College is given by W. B. Drummond.[5] The aim of the course is definitely practical. What is intended is that the students should be taught to observe children; that they should learn to form judgments as to their state of health and nutrition; that they should learn to recognize the signs of fatigue, of debility, of nervousness; that they should become acquainted with the more frequent disorders of childhood, and especially with those which interfere with their own work as teachers (*e. g.* adenoids, deafness, defective vision); that they should learn to appreciate the dangers to which children are exposed in school —from faults in the school building (bad ventilation, bad lighting, etc.); from faults in the school work (too prolonged mental strain, too fine sewing, bad postures, etc.); from faults in their neighbors (infection and contagion). Moreover, in the work of medical inspection, it is necessary that the teacher should give some assistance to the medical examiner, and therefore the students are taught how to

(4) Jour. Am. Med. Assoc., Dec. 11, 1909.
(5) Glasgow Med. Jour., June, 1910.

weigh and measure children, and to make and record other observations. It is not intended to make the student "a kind of doctor," but it is hoped that he may be helped to recognize when a doctor's advice is needed.

The methods of instruction include lectures and demonstrations, visits to schools and practical work by the students in class.

The actual observation of children forms an important part of the course. For this purpose selected children are utilized very much as patients in the infirmary are utilized for clinical lectures and demonstrations. For demonstration one does not restrict oneself to what the medical student would regard as "good cases." It is important that the student-teacher should learn to recognize a normal child when he sees one. Moreover, one prefers, as a general rule, to avoid demonstrating children who are so grossly abnormal as to be presumably sensitive on the subject. Minor abnormalities, such as the student is certain to meet with frequently, afford the best material for class purposes, and are abundant in every school.

Longevity. From a study of the distribution of longevity in England and Wales, W. Gordon[6] concludes that the low percentages are found in the relatively dense populations and all the high percentages in the relatively sparse populations. There is a very remarkable disparity of longevity in different districts of England and Wales. This disparity is closely related to density of population but the mere movement of population from country to town, while probably tending to make the disparity appear greater than it really is, has, on the other hand, probably no very considerable effect on the figures.

Water-Supply.

Water-Supply of Lake Towns. From a review of the condition of the water supply of towns lying on the shores of Lake Michigan, W. C. Bouton[7] concludes that the water within a short distance of the shore is so pulluted as to necessitate the filtering or boiling of the municipal supply. He quotes the advice of Prof. Barton to the effect that in the circumstances it would be best to

(6) Brit. Med. Jour., June 5, 1909.
(7) Chicago Med. Recorder, Jan., 1910.

treat the sewage emptying into the lake and to filter the water. In his opinion settling-tanks and sprinkling-filters would be most practical for such a city as Waukegan. For water purification mechanical filters using sulphate of aluminum and lime or iron sulphate and lime as a coagulant, with the possible use of a small amount of calcium hypochlorite as a disinfectant would give the best satisfaction. A plant to filter five million gallons a day can be constructed for $75,000 to $100,000.

Necessity for a Filtered Water-Supply. M. P. Conway[8] refers to the experience of the old world which has shown a reduction of water-borne diseases almost to a minimum by the introduction of filtered water, and notes that the method is being introduced in an increasing number of American cities. During the last five years no less than 50 of our cities have undertaken work of this character, and in every instance the efficiency of filtration has been demonstrated.

Water-Supply of Ships. There are four methods of supplying drinking-water on board ships. The first is the storage of the water in tanks and barrels which have been filled over the side from some regular supply such as a water-boat which has run alongside. By the second the water is pumped in or otherwise forced into the tanks through a hose from a city supply over the side. By the third method the ship takes water in midstream or when out in the lakes by pumping through the sea-cock. The fourth method is to condense the drinking-water from steam. Of all the methods it is readily seen that there is only one which may be relied on for purity, namely that of obtaining the drinking-water from the condenser. All other sources are dangerous to a greater or less degree.

These dangers are emphasized by J. O. Cobb,[9] especially in the case of conditions prevailing on the steamers plying the great lakes. He describes the various methods by which water is provided and indicates the serious chances of contamination. He says that all water aboard ship, for whatever purposes, must first pass through the sea-cock and pipes leading from it, and it must be alarming for one to discover, while a passenger on these vessels, many of

(8) Buffalo Med. Jour., March, 1910.
(9) Jour. Amer. Med. Assoc., Dec. 18, 1909.

which are floating palaces, that he has been drinking water which was introduced into the ship through pipes smeared on the inside with sewage. It cannot be clean, cannot be free from bacterial life and fecal matter. Surely no man would dare say that such water was clean and free from danger.

There are but two practical methods to avoid this contamination. One is to disconnect the drinking-tanks from the other pipes, so that it would be impossible to fill them with foul water accidentally. Then it would be necessary to drop a pipe over the side when out in clear water, and pump the water into the tanks. All the officers with whom the matter has been discussed think that this method would also be objectionable because someone would forget to haul in the pipe that was over the side. The second method, and the only reliable way to obtain absolutely pure water, is to condense it, as is done by ocean-going steamers. It could be installed on any steamship with comparatively little expense.

Milk-Supply.

Certified Milk. The need of certified milk is strikingly shown by the figures of bacteriologic count made for the Toronto Milk Commission,[1] on the milk supply of a number of the city Hospitals and other institutions. Shortly after the organization of the Commission, several institutions sent samples of their daily milk supply to Prof. Amyot of the Laboratories of the Provincial Board of Health, Toronto, for examination: More than one bacteriologic count was made for some of the institutions. Taken at random, these milks showed to the cubic centimeter (about 16 drops) 1,500,000, 1,200,000, 83,200 4,500,000, 6,500,000, 310,000, 18,900, 200,000, 17,600, 120,000, 280,000, 90,000, 254,000,000 bacteria.

Future Milk-Supplies. E. J. Lederle[2] sketches the future milk-supplies of large cities substantially as follows: Milk production, transportation, and distribution will be under strict control, federal, state and municipal. Every farm producing milk for sale will operate under a permit. Not only will there be the strictest requirement

(1) Dominion Med. Monthly, January, 1910.
(2) Jour. Am. Med. Assoc., Mar. 19, 1910.

as to cleanliness in all operations, but producers will be taught methods by which the results can be obtained in the most economical manner. Creameries will be of the most improved types as to construction and equipment, and will be permitted to standardize milk, the only means the dealer has of selling milk on its merits. Only refrigerator cars will be used in the transportation of milk which will be in sealed containers, preferably the single-service packages. All dipping of milk will be forbidden; where milk is permitted to be drawn in stores it must be from steel containers, from some form of spigot and delivered to the customer in single-service packages. The grades of milk will be as follows:

Infant's milk. Distributed from infant's milk-depots and by dealers. Certified milk, raw. Clean milk from tested cattle, pasteurized. Modified milk made from either of the above grades.

Family milk. Clean, raw milk from tuberculosis-free herds. Clean pasteurized milk from such herds. Clean skim milk, raw or unpasteurized. All cream except that from guaranteed or certified milk, to be pasteurized and sold according to the amount of butter-fat it contains.

Milk from untested herds will be permitted to be sold when properly pasteurized, as well as milk from cows which have been tuberculin-tested and have reacted, but which it has not been deemed necessary to destroy.

Milk-Depots; Educational Responsibilities. The value of instructions given at the milk-depots in the prevention of infantile mortality is brought out by I. S. Wile[3]. He divides the causes of infant mortality into four groups as follows: 1. Prenatal causes, as immorality, venereal disease, tuberculosis, alcoholism, employment of expectant mothers, etc. 2. Causes operating at birth, as hasty obstetricians, premature birth, fetal malformation or disease, etc. 3. Causes of death in the first quarter of the year as, inability of the mother to nurse, death of the mother, overlying, infection of the cord, early re-employment of the mother, neglect, etc. 4. Causes of death during the first year after the third month, as impure milk, poor domestic hygiene and housing, poor child hygiene, climatic conditions, etc. Wile does not place so great an

(3) N. Y. Med. Jour., Jan. 15, 1910.

emphasis on the lack of breast-feeding as others, but notes that the greatest number of deaths occur during the first three months' period when the majority of mothers nurse their children. The greatest number of deaths from food occur after the weaning period and can be traced not to the character of the food itself, but to the insanitary contamination which it receives. In the author's opinion the real cause of infant mortality is ignorance, and the function of the milk-depot should be not merely to supply pure milk, but to teach why such a supply is necessary and to instruct mothers so that the other causes of infant mortality shall be removed as well as the contaminations of the food. The function of the milk-depot is to combat infant mortality. To subserve this end fully, education should cover four special periods and their particular problems as relating to infant mortality.

The Prenatal Period. To cover such questions as sex hygiene, illegitimacy, venereal disease, alcoholism, occupational diseases, food, clothing, bathing, exercise of expectant mothers, maternal impressions, care of the breasts, etc.

The Parturitional Period. To cover all preparations for confinement: preparation of bed, cleanliness, outfits for the mother and child, preparing for the care of the cord, blindness, and venereal disease, care of the eyes, etc.

The Puerperal Period. To cover hygiene of the first two months: care of the breasts, diet, predisposing causes of a failing milk-supply, danger of early re-occupation of mothers, danger of overlying, necessity of breast-feeding, etc.

The Puericulture Period. To cover child hygiene: breast feeding *versus* artificial feeding, home care of the milk, home hygiene, regularity of nursing, etc., when advisable not to nurse, when to wean and how to wean, home milk modification, foods and food values, dietary from one to two years, relation of weight to vitality, etc.

Milk-Intoxication by Ergotic Flora. C. B. Fitzpatrick[4] calls attention to the dangers of a poisonous action of milk in consequence of the ingestion of poisonous plants by the cow, and the excretion of the poisonous constituents in the milk. He believes that the New York milk zone contains a large number of toxic weeds and diseased food

(4) N. Y. Med. Jour., Apr. 2, 1910.

plants which may make the milk in some cases injurious to the consumer. He has especially investigated the possibility of milk poisoning by ergot. He has been able to show experimentally that ergot administered to women may be excreted in the milk in considerable quantities In view of these facts it becomes important to know what symptoms in the case of infants might indicate a poisoning by ergotic substances in the milk. The author makes the following summary of conditions which resemble poisoning by ergot:

The symptoms of cases of infant mortality resembling mild cases of ergotism may be conveniently summarized as follows: The skin has a yellow or earthy color, covered with a cold sweat; boils or eruptions may appear; blebs, like those caused by burns or scalds, have in a few cases been observed.

Weakness, contraction of groups of muscles, anemia, affections of the vision, amaurosis and amblyopia, are frequent. Fainting, epilepsy and convulsions which mostly begin with some cerebral disturbance, are observed.

Sparks before the eyes, giddiness, noises in the ears and a creeping feeling about the body occur. There is also very commonly anesthesia of the fingers and toes, and later of the extremities and of the back and even of the tongue. Diarrhea, vomiting, colic, and other signs of intestinal irritation seldom fail to be present. There are also tetanic spasms of the muscles, rising in some cases to well-marked tetanus.

There may be acute pain in a limb, which is about to mortify, or there may be prodromata similar to the symptoms already described. The limb may swell, be covered with an erysipelatous blush, but at the same time feel cold. A dry or moist gangrene may develop. The part may be mummified and be separated from the healthy by a moist ulcerative process.

The author sums up the action of ergot as follows: Ataxia, dyspepsia, salivation, gastro-intestinal irritation and hemorrhage, gangrene and paralysis.

MILITARY HYGIENE.

Care of Sick and Wounded. In the opinion of J. R.

Kean[5] the failure of the nation to provide adequately for its sick and wounded soldiers in time of war depends not so much on any indifference as on a lack of a proper conception of what is needed for the performance of such service. The tendency has been to limit the army surgeon to the care of the immediate needs of the wounded soldier, and to deny him authority to provide for the prevention of disease. The duties of a medical officer are such that they can not be performed by the ordinary practitioner without adequate military training and experience, and the service requires a larger number of men than is provided. The estimate of the Surgeon General is that to man the field organization of the medical service and the service of the line communications and base requires one per cent. of the strength of the army. It is at present about one-third of one per cent. The pay of the army surgeon is sufficiently above that of the ordinary practitioner beginning practice to offer an inducement to young men to enter this form of medical service. The pay with perquisites amounts on entering to the equivalent of $3400 per year and at the end of five years reaches the equivalent of $4000 a year. The opportunities for scientific advancement are good.

In addition to an increase in the numbers of medical men in the regular army we need a careful system of training for the medical personnel of the organized militia, which is a part of our first line of defence. This should be uniform throughout all the States and should be promoted and assisted in every way by the War Department through its militia division. We need also to have a large number of capable, well-educated young men on the rolls of our Medical Reserve Corps, who will be available in time of war and receive some instruction in time of peace by being called out for a week or two of duty at the maneuver camps. It is the intention of the department to make the examinations for the commission in the reserve corps as rigid as is the examination for permission to practice in any State. It would greatly increase the value of these commissions if the State authorities in each State would confer on the bearers of them the right to practice in any State.

(5) Med. Rec., Aug. 14, 1909.

The National Guard Surgeon. W. G. LeBoutillier[6] emphasizes the need of training of the National Guard surgeon and his duties in training the hospital corps. What can be done with the hospital corps men is to train them to be soldierly and disciplined, to act as bearers and to give first aid, to erect and equip the hospital tents, to cook and to transport the sick and wounded. The latter service is to be learned in connection with the field hospital whose real function is to transport the sick, not to treat them except when absolutely necessary, as after a fight.

Actually the most important duty of the National Guard surgeon is to study military hygiene, the military law, regulations and orders, to prepare himself for service in the field and at the front. His duties bring him into constant and close relations with other departments, and he must know almost as much about subsistence and transportation as a commissary or quartermaster. He must know all about the management and control of a company, as he has to care for his hospital corps men and the sick in hospital in the same way that the captain of a company of infantry or cavalry cares for his men. There is indeed nothing that he can know about military matters that is not likely to be at some time of service both to himself and to the troops with which he is on duty, and to increase his value and efficiency as a purely medical officer.

The National Guard surgeon must learn field sanitation not only by reading books but by actual field experience. His responsibility is not for what is actually done in the field by the troops but for giving correct advice to his commanding officer. A highly important duty is to teach sanitation to the line officer, and so to conduct himself that he may gain the confidence of his commanding officer so that his recommendations will be considered judicious and will be put in force. To care for troops properly it is necessary that every line officer should be interested and trained in military hygiene. If only the physically fit are enlisted, enlightened care of troops will maintain them in health, unless military necessity requires their expenditure by disease or overwork, just as any munition of war is expended to defeat the enemy.

(6) Med. Rec., Aug. 14, 1909.

Medical Service in the Navy. C. F. Stokes[7] calls attention to the necessity for careful selection of the material for the navy so far as physical efficiency is concerned. Decisions of the naval examining board are sometimes questioned by interested politicians and civil surgeons, but while the physical standard is high the board seldom has occasion to reverse its decisions. The varied requirements on the modern battle-ship and in the modern naval battle require men of the highest physical vigor and nervous and mental stability to endure the strain and assume the responsibility imposed. The following details of examination are given:

The sight is tested, the hearing tried, the color sense looked into, the teeth inspected, likewise the mouth, fauces and nares, and all abnormalities are noted, whether the applicant is rejected or not. He is stripped and looked over for ankyloses and deformities—for hernia, for hemorrhoids, for fistula, for venereal diseases, and for lung and cardiac lesions. Each candidate is weighed and measured, and for purposes of identification, all scars and physical characteristics are noted, and thumb and finger prints are recorded as well. This enlistment record follows the man throughout his career in the service, is added to from time to time, and is finally filed at the Navy Department for reference in connection with possible future pension applications.

So much for the material we have to deal with professionally. How do we safeguard this material from disease and injury? First, let us consider nutrition. All water in use on board ship for drinking purposes and in the preparation of food is distilled. The navy ration has been worked out upon scientific lines, and the necessary number of calories are provided for. The supply ships of the fleet are stocked with fresh meat and vegetables in abundance, and each warship is equipped with an ice-plant. A much-needed school of cookery has been established for the instruction of navy cooks; this, in time, will lead to the proper preparation of the ration and the prevention of undue waste. Painstaking care has been devoted to the hygienic features of lighting, heating, and ventilation of living spaces on board ship. Dryness has supplanted moisture

(7) Med. Rec., Aug. 14, 1909.

between decks, and the common drinking-cup has disappeared. Each hospital ship carries a dentist, and it is amazing to see the numbers of men who, of their own accord, apply for dental treatment.

Enough has been said to show to what extent preventive measures prevail in naval practice. Most gratifying results have followed the systematic prophylactic treatment of venereal disease. In the old days Stokes has seen a ship leave the Asiatic station with 90 per cent. of her crew syphilitic; to-day the percentage is not more than 2 or 3, if that much. While these satisfactory conditions exist on board ship, we are unable to control our men on shore; and sooner or later, when they remain long in a port, they acquire a fair share of the prevailing diseases of that particular locality if given much shore leave. As our men are young and recruited from rural districts, where the common diseases of childhood do not prevail, these diseases find virgin soil in the navy, which accounts for the frequent outbreaks of measles, diphtheria, scarlet fever, chicken-pox, and other diseases of this sort. When the Atlantic fleet arrived in Honolulu, 10 days from San Francisco, there were 59 cases of contagious diseases distributed among the ships.

Stokes calls attention to the fact shown by experience that the casualties in a modern naval battle are about 30 per cent. of the fighting force and shows that the provision for the care of the wounded is insufficient. He advises that there should be one spacious, stable hospital ship with a capacity of at least 500 beds with each fleet, and at least one fast ambulance ship with each fleet to act both as tender and medical transport, and to be employed in removing the wounded to shore hospitals. A naval medical reserve corps should be established, so that those whose services will be required in war times shall be familiar with their duties and the peculiarities of the naval service. Properly appointed hospital ships should be specially built for the purpose. The ordinary merchant steamer is just about as useful as a hospital ship as it is as a fighting ship. At least two hospital ships should always be in commission for drill purposes, and each should always be commanded by a medical officer with a competent navigating officer under him. This arrangement worked with perfect satisfaction

on board the Relief. To equip, organize and run properly a 500-bed hospital afloat is an undertaking requiring executive ability, force, skill, and tact; the unusual problems incident to such a command should all be worked out in time of peace.

EUGENICS.

Race Breeding.

J. Grinker[8] emphasizes the importance of proper mating as the first step in the breeding of a good human animal. No one should be permitted to marry who is a physical or mental cripple. The first thing to be demanded of each of the contracting parties in the business of race breeding is a clean bill of health; next, a family record of freedom from hereditary degenerative tendencies. The author gives the following advice as to the training of children:

1. Meat should be prohibited for children under five years of age and should be used very moderately after that age. Coffee, tea and alcohol should be forbidden.
2. The child should be accustomed to variations of temperature.
3. Insist on exercise, but not in excessive amount.
4. Steel the child against pain and discomfort. Intolerance of noise is an early sign of nervousness and should be met by noisy games which normal children seem to enjoy.
5. Teach the child to control its emotions.
6. Teach the child absolute fearlessness. Do not fill its little brain with ghost stories and the horrors of hell.
7. Children should not accompany their parents on their annual travels and long vacations. Their small and undeveloped brains are not ready to assimilate the many new impressions.
8. Inculcate a love of labor for its own sake, not for mere reward.

The author gives the following advice regarding punishment: Do not punish when angry. Do not identify the child with its fault. Do not lecture children. Do not administer corporal punishment. Under the head of literature the author would permit parts of the Bible but would

(8) Ill. Med. Jour., September, 1909.

forbid novels and the daily newspaper. The daily newspaper is often unwittingly an instructor in crime and immorality, and no school child should be permitted to study its pages of obscenity.

Grinker advocates instruction of boys and girls in sexual matters, boys to be taught by the father and girls by the mother. There is less danger in too early than in too late instruction. How best to impart a knowledge of proper sexual hygiene to the innocent has recently become a favorite theme for discussion among the best educators of the land. It is generally believed that the subject can be appropriately taught by a reference to Nature. Sex methods can be illustrated throughout living Nature by a gradual approach from the lowest forms to the highest so as to give least offense to our usual ideas of propriety. The study of biology removes all mystery from the subject and satisfies our half-grown inquisitive children, and at the same time affords an opportunity for explanations of a practical character.

Grinker wonders whether woman has not neglected the most noble vocation in her life—the rearing of the best possible generation. Woman has proven her equality to man in all the learned professions; the profession of maternity, she has wilfully neglected. Is there a nobler work imaginable than that of rearing a strong moral and intellectual race of men and women? But, alas, in too many instances our modern women permit peasant girls—or, at least, women of the inferior class—to rear their children, to instill into their young minds the most fanatical superstitions and, perhaps, to corrupt their little bodies. If we wish to bring up the proper kind of posterity we must take a hand in the business ourselves.

To accomplish this satisfactorily woman must acquire some knowledge of the groundwork of biology and some acquaintance with the natural history of animal forms. The time spent in these studies and their practical application to human wants will ultimately result in great good to future gene- tions.

Vasectomy.

Vasectomy as a means of preventing procreation in defectives has been applied by H. C. Sharp[9] in about 500

(9) Jour. Am. Med. Assoc., Dec. 4, 1909.

cases with very gratifying results. The operation is a trifling one which causes little inconvenience and is devoid of danger. It does not interfere with sexual intercourse, but prevents impregnation. Sharp has noticed an increase of vigor and some beneficial results in neurasthenia. The end of the vas next the testicle is left open so that the secretion finds its way into the tissues and is absorbed thus securing its tonic effect.

The operation in the female is more difficult, but, if skilfully done, no more hazardous. There are a large number of girls detained in public institutions because they have not the character to resist the importunities of unprincipled men when thrown on their own resources. The result is that when they are released from the institution they shortly return in a state of pregnancy, or marry some one unable and unfit to rear a family. In either event there is an addition to the dependent class. With the oviduct severed this danger is absolutely obviated. In case of the male the desire for the opposite sex is in no way diminished; his mind is strengthened and his nervous system benefited from the reabsorption of sperm. It has a decided effect on the centers of self-restraint, besides improving the physical condition, as the masturbator refrains from excessive indulgence in this practice. Almost wholly as the result of increased will-power, the rapist or criminal will be aided in resisting his pernicious impulses. Thus we have a means of preventing procreation in the unfit, at the same time improving the condition of the unfortunate individual.

Infant Mortality.

Prevention. The prevention of excessive infant mortality is exciting the greatest interest of sanitarians especially in France and Germany. A *resumé* of the arrangements for this purpose in France is given from an article in the *Semaine Médicale* by Loewenberg.[1] The efforts to prevent infant mortality are divided into two classes, those directed to the causes acting before birth and those directed to the prevention of disease and death of the child after birth. The first class comprises dispensaries for the advice of pregnant women, with directions to obstetric hospitals. In addition there are associations called *Mutualités maternelles*

(1) Deutsche med. Wochenschr., Nov. 18, 1909.

which afford a sort of insurance against the needs of the puerperal period. There are also numerous institutions intended to preserve the life of the infant after its birth. Consultations for the instruction of mothers, the *gouttes de lait, crêches,* institutions which offer a money prize for breast-feeding, each play a part in the securing of this end. The necessity of breast-feeding for the average child does not seem to be appreciated, and the various agencies seem to accomplish far less than could be desired, but notwithstanding the various obstacles the efforts of philanthropists and sanitarians have had a perceptible effect in the reduction of infant mortality in France.

Lectures for Prevention of Infant Mortality. J. Sobel and L. Marcus[2] describe a system of lectures to mothers and girls on the care of infants which were given during the summers of 1908 and 1909 under the auspices of the Department of Health in New York City. They specially emphasized the dangers from the use of loose milk or grocery milk as it was called, and gave simple instructions as to the care of the babies. These instructions were impressed by securing compositions from the attending girls who described in their own way how to care for the baby. The authors affirm that already the tenement house population has been aroused and interested by the dissemination of knowledge obtained at these lectures. The use of grocery milk for the feeding of infants was markedly diminished. The vicious habit of feeding with any and all kinds of gastro-enteric irritants was curtailed. The obnoxious habit of adding large quantities of brandy to boiled and cereal waters and the giving of wine and beer to older children was in a great measure remedied.

Instruction in Clinics. B. Boye[2] credits a considerable portion of the decrease in infant mortality in Halle to the care exercised over the children which were brought by their mothers to the clinic. This was especially true in the case of illegitimate children whose death-rate is always relatively higher than that of those born in wedlock. An association was established for the instruction of mothers and encouragement to nurse their children, and for the purpose of assisting needy women with small money pay-

(2) N. Y. Med. Jour., Mar. 19, 1910.
(3) Klin.-Therap. Wochenschr., Feb. 21, 1910.

ments for weeks or months after delivery. These contributions were intended to give the patients better food so that they could be better able to perform their function of nursing. The association also provided a milk-kitchen which furnished pasteurized milk ready to drink, and later sterilized milk in small flasks suited for a single portion. Only the very poor were supplied *gratis,* others being required to pay according to their economic situation. The instructions given by the institution are very valuable, but the author does not think that the mortality of infants is greatly influenced by the condition of the dwelling if they are given proper food. He believes therefore that the cause of infant prophylaxis will be better served by continuing the supply of milk, as it is impossible to supply what is needed in the way of improved tenements. It would, however, be of service if provision could be made for better care of the illegitimate children who are much more liable to die than the legitimate.

PUBLIC HEALTH PROBLEMS.

National Department of Health. In considering public health problems G. M. Linthicum[4] says that the great problem of the future is the betterment of health by the education of the whole people as to its possibilities, teaching them the simple laws regarding food, drink, air and sleep. Our knowledge to-day is sufficient in itself, if it were employed, to increase human life at least fifteen years. Simply enacting laws will, in itself, be of little or no value, but such laws enacted and their value demonstrated to the people at large, preferably before their passage, will be beneficial just in the proportion in which they are intelligently comprehended. The ideal time for teaching preventive medicine is in childhood; every school should provide some instruction along this line. The impressions of childhood are the effective, lasting ones.

The problems of health are not given great consideration by the usual adult. If he is an alcoholic, and has lived three-score years, this is attributed to the morning drink; if he were a smoker, tobacco has preserved him; if he were an abstainer, it is because of his abstemiousness. No one attributes it to a high degree of vitality; and here

(4) Jour. Am. Med. Assoc., June 4, 1910.

is the real problem in the fight against the usual diseases which decrease the breadth, and at the same time, while not in themselves fatal, lessen the length of life. The real problem, then, is to build up a constitution by prevention of diseases which we know to be preventable by sanitary means; to increase the efficiency of every individual by increasing his vital resistance, thereby establishing a bulwark against the inroads of many troubles which follow a depleted or lowered standard.

To correlate all these forces working for the uplift of man, to increase his health and thereby his happiness, there can be no greater assistance than to elevate the profession to the highest honor to which it is entitled, and there is no more potent way to increase its field of usefulness, to engender for it the confidence of the people, to spread the gospel of health, to discredit fads and quackery, than to harmonize all departments under a national department of health. For this every physician, and every county and state society, and finally the national association should strive.

The Federal Government in Relation to Public Health. The work of the Federal Government in relation to public health and the history of its activity in scientific research is given by J. W. Kerr.[5] The division of scientific research was established in 1902 and through it a considerable number of investigations have been prosecuted. Through Stiles' investigations of hookworm disease, *Uncinaria americana* has been identified and shown to be responsible for the physical and mental impairment of certain classes of the population where the disease is endemic. As a result, a campaign, financed by private philanthropy, has now begun, and there is every reason to believe that hookworm disease will in time be effectually controlled. Through studies of anaphylaxis made in the Hygienic Laboratory, greater precision has been attained in the testing of therapeutic serums, and some light has been thrown on the cause of sudden deaths following their injection.

The discovery of plague among ground-squirrels in California has resulted in an extensive campaign for their extermination, over 34,000 of these animals having been

(5) Cleveland Med. Jour., December, 1909.

destroyed within a period of five months. It has also permitted studies of the susceptibility of these animals to plague infection and experiments regarding the transmission of the disease through the agency of fleas. When in 1905 the British Plague Commission at last proved that the species of flea known as *Pulex cheopis* was the intermediary agent in the transmission of plague, it was determined to ascertain whether this particular flea was to be found in our country. Upon consulting different works on entomology, it was astonishing and confusing to learn the many different species of this insect, but practically no light was thrown upon the question that had arisen. It has since been found in San Francisco and elsewhere that other species of fleas may play the rôle of plague-carrier, but in the meantime, reports and specimens had been received from the officers in many parts of the country which proved conclusively that *Pulex cheopis* was widely distributed. To show the extent of this work it may be of interest to state that in San Francisco alone more than 19,000 fleas were captured and identified by the officers there.

In the Hygienic Laboratory, many investigations have been made, and the results of the more important ones are contained in the 58 bulletins that have already been published. Many of these bulletins are authoritive on the subjects of which they treat, and very well represent the scope and importance of the scientific work done in that institution. A number of important investigations are still in progress such as the study of typhoid fever which has been prevalent in the district of Columbia, the investigation of the pellagra epidemic which has recently attracted so much attention, the relation of rodents to the transmission of plague, and a considerable number of studies in the field of pharmacology such as the standardizing of disinfectants and the determination of the best methods of their practical use.

Health Officers. W. M. Brumby[6] refers to the undesirability of public health officers continuing the private practice of medicine. While the health officer may be conscientious and may do his work well, his fellow practitioners will be jealous of any publicity he may gain by

(6) Jour. Am. Med. Assoc., Dec. 11, 1909.

taking the initiative in matters of education of the people and will try to make him efface himself as much as possible. This is likely to result in insufficient activity in regard to the public health, to the great detriment of the community. The only logical result will be that health officers will be paid to do their work so that they will not have to do practice on the side to gain a livelihood.

Value of a State Laboratory. The value of state laboratories[7] in advancing hygiene has only recently been appreciated. The first laboratories were established in cities while the country districts were unprovided for, or were obliged to resort to private laboratories or fail to receive the benefits of laboratory investigation. County laboratories have been established in some counties but they do not usually correspond to the need. It would seem therefore that there should be no hesitation on the part of the State to furnish a proper laboratory, one that is large enough and sufficiently well equipped to allow not only that the routine duties should be carried out to the best advantage, but to permit, as well, the undertaking of investigative work. The great advancement of medical knowledge is largely the result of experimental work carried on in the laboratories. Before new methods can be employed by the profession at large, they must be shown to be of value, but at the same time harmless to the individual. Much of the information has to be acquired from the clinician before the laboratory results can be verified. Consequently the closer the relation between the two classes of workers the better will it be for the science of medicine.

A State laboratory should therefore be a center for the acquisition and dissemination of medical knowledge. From it should come an inspiration for the rest of the State. The men employed should be those of enthusiasm, capable of carrying on the work to the greatest good of all concerned. In order that this may be accomplished it is best that the laboratory be established in a locality that is an active medical center, so that its work can be seen and felt by those directly concerned in the teaching of medicine. The constant contact with other men doing similar work provides a stimulus that is unequalled by anything else. The spirit of rivalry and emulation, when not carried to an

(7) Jour. Mo. State Med. Assoc., April, 1910.

excess, has done more for the advance of science than any other factor.

Popular Education. The value of various methods of educating the public on health matters is pointed out by S. Egbert.[8] Education in the principles of hygiene may be given in the public schools and practical demonstrations of the methods of physical culture can be given in the public playgrounds. The health boards have made use of sanitary bulletins and are now beginning to use the newspapers for this purpose. Magazine articles can also be made efficient in educating people in health matters. Life insurance companies have facilities for reaching many who are in need of instruction. Public lectures are another powerful means of influencing the public and should be freely employed. In addition great help is to be expected from the clergy and the church organizations. The public health authorities by tuberculosis dispensaries and other similar organizations and by aiming to unite all good citizens in the work of promoting the public health will eventually contribute to an enormous saving of human life which in money value alone will well repay the necessary effort.

Nursing Problem.

T. Potter[9] deplores the tendency of nurses to assume the rank of a profession and to combine together with a view of raising the fees for service which in some cases are beyond the power of people in moderate circumstances to pay. He finds that the conception of a profession involves autonomy and independence, and the very essence of a nurse's work involves subordination. In his view, therefore, the nurse should recognize her place and not seek to assume an independence which would vitiate her relations to the medical profession. He does not deny the right nor the desirability of maintaining an average minimum wage for nurse's work, but it should be recognized that the fees, like the doctor's charges, should be adapted to the patient's financial ability. He believes that there is a demand for nurses who being not yet graduated can give their services at moderate fees.

The text-books prepared for nurses are objectionable as

(8) Jour. Am. Med. Assoc., June 11, 1910.
(9) N. Y. Med. Jour., May 14, 1910.

giving a smattering of medicine. In the language of an eminent British medical authority, the trained nurse has stolen the birthright of the medical student. It is the opinion of some that the medical student should pass through a course of training in the elements of nursing, and the author thinks it might be desirable for a time to put them under the direction of the head-nurses. Turn about he says is fair play.

Potter summarizes the questions involved as follows:

1. Is the establishment of independent State boards of examination and licensure for nurses, and State registration for nurses, a necessary or rational or expedient thing, in the best interest of the public, the medical profession and the vocation of nursing? Should the whole system be abolished or radically simplified?

2. Is the anxious endeavor to establish popular and official recognition of nursing and the nurse as belonging to an autonomous and independent profession, either rational or moral, and in harmony with a proper alignment of things in the social order? Is it to the best interest of the three parties concerned, the public always first, and promotive of their harmonious working?

3. Should there be a revision in the training schools, especially a shortening of the time required for graduation?

4. What of the question of the charges for nursing service, and of the application of them to the public?

5. Does the logic of the situation, the rights of those who aspire to make a business of nursing the sick, the requirements of practical medicine and surgery, and the rights and needs of the public, point toward the establishment of two grades of trained nurses, the one primary and graduate, the other ordinary and simply certified? Practically we have such in crude fashion now; shall we hereafter have it in definite and orderly form?

6. Should the whole nursing problem be taken up, thoroughly considered, and with justice and dignity acted upon by some general professional body like the American Medical Association or other responsible and recognized organization?

Defects in the Present System. T. E. Satterthwaite[1] considers the defects of the present system of providing

(1) N. Y. Med. Jour., Jan. 15, 1910.

nursing for private cases. He mentions the need of supervision and emphasizes it by an incident in which a neurasthenic was permitted to indulge in cigarettes, although tobacco had been strictly forbidden by the physician in charge. Again the nurse may forget her proper relations to the physician. He believes that many of these evils could be obviated by a board of registration. The high prices charged by nurses are often prohibitive. This has been met to some extent by the visiting nurse societies of Philadelphia, but they do not as yet adequately cover the ground.

W. O. Stillman[2] describes a successful experiment in educating efficient nurses for persons of moderate income. A course was arranged which could be completed in six months. Four months are devoted to class work including lectures by physicians and by the superintendent who is a registered nurse. The requirements for admission to the school do not require a high school certificate but only a grammar school education. The pupils are trained to take temperature, pulse and respiration, to keep records, to use the catheter and give enemata, etc. Nurses trained in this way can work for from $12 to $15 per week, to which figures they are encouraged to restrict their charges.

Mrs. Hunter Rob[3] discusses the importance of an International Standard for nurses. Different countries in working out the nursing problem are approaching the same methods and working toward the same common standard. The author feels convinced that this standard would be realized much more rapidly by concentrating more attention on the methods employed in the actual making of the nurses, and insisting on rendering universal a thoroughly practical training.

Reduction of Cost of Nursing. F. W. Patch[4] considers that the most urgent need of nursing for people of moderate means might be met in some degree by a further extension of undergraduate service. He notes the following advantages:

1. Undergraduate extension service will settle the controversy between the advocates of two years and those of

(2) Ibid.
(3) Ibid.
(4) Boston Med. and Surg. Jour., Sept. 2, 1909.

three years as a proper period for the nurse to spend in training.

2. It will give the pupil a wonderful opportunity for further object study in her profession along social and humanitarian lines.

3. It will relieve, in some measure, the financial drain in the conduct of the training school.

4. It will produce a body of nurses with a more fully-rounded education, better grounded in the humanities, better fitted to handle the countless practical problems arising during sickness in middle-class homes, and more suited to become centers of personal influence in later life.

5. It will, in a large measure, meet a real and crying demand for an efficient nursing service on the part of a great self-respecting body of people who are able and willing to pay moderately for that which they are evidently unable to have at "regular rates."

CLIMATOLOGY.

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CLIMATOLOGY.

[The written matter on Climatology is becoming very small in amount, as is to be expected. Almost all climates have been fully exploited and reported on in these publications, and time enough has not elapsed for further observations to be made either in new lands or old. A new phase of the subject appears in *Tropical Medicine,* which bids fair to become a field of great interest and importance. The exhibition of the matter of climate during the past few years has been of great help in educating the profession and the public in the true value of climate, and, it is to be hoped, destroyed the fetish of climate, the worship of which, and the hopeless search for a cure-all in some quarter of the globe, has caused much suffering, many deaths and great disappointments.—EDITORS.]

THE CLIMATE OF THE NORTHWESTERN STATES OF NORTH AMERICA.

This subject is fully discussed by H. L. Taylor.[1] The region consists of a sea-coast strip, a desert, a mountain region, a high plateau and a plain of about 1,000 feet elevation. The sea coast is a narrow strip of territory between the Cascades and the Pacific, generally called the Puget Sound region. Here is found a moist, mild climate with an annual rainfall of 53 inches, great equality, a range of only 23.5° in the year, a marked wet and dry season and rare high winds. In many regards it is like the English climate; abundant sunshine during the summer, almost none in the winter, is a marked feature. The warm Japanese current gives it equability.

Between the Cascade and Rocky mountains lies the valley of the Columbia River, containing large arid tracts susceptible to cultivation, if irrigated. It is a northern extension of the great American desert and the climate is

(1) Trans. Am. Climat. Assoc., 1909.

of a desert type showing great variations of temperature, from 30° F., to 115° F., little rainfall and the mild Chinook winds that temper both heat and cold. The mean annual temperature is about that of Virginia. Spokane on the extreme east of this region is 2,000 feet in elevation and has a very good climate. It is free from desert sand-storms, yet shares the good qualities of that region.

In Idaho and western Montana the mountain climate is found. On account of different altitudes and sheltered valleys a great variety of climates are in this section. Localities exposed to the cold Canadian winds are very cold in winter, 68° below zero F. having been recorded. These cold winds become moderated passing over the high mountains, and the Galeatin and Bitter Root Valleys, 4,500 and 2,500 feet high, are fertile, irrigated farming regions, but with a great daily and annual range of temperature. The Yellowstone Park is in this region.

Eastern Montana and the western Dakotas form a high untimbered plateau. Great annual ranges of temperature, constant winds and light rainfalls characterize this part. The eastern Dakotas are lower, have more rainfall, less range of temperature, but abundant wind. Minnesota with its wooded areas offers the first relief from wind. It is of about 1,000 feet elevation, with a high percentage of sunshine and a heavy snowfall.

The coast section is useful for such cases as require a moist climate, some asthmatics being greatly benefited. The desert of Washington is suitable for the same patients who usually go to Arizona, and the winds and sand-storms are equally to be guarded against. Spokane has been useful in many cases of incipient tuberculosis. High-altitude treatment for tuberculosis could be found in many sheltered valleys in the mountains, but no sanatoria exist in this whole area.

In the high plateau regions of Montana and the Dakotas the great range of temperature and the winds are most objectionable. Minnesota has sanatoria for its poor and the Pokegama Sanatorium, half way between Twin cities and Duluth, has been open for years. The steady cold and dry air are invigorating to those robust enough to respond to it.

Lobar Pneumonia and the Canadian Climate.

The climatology of Canada and lobar pneumonia is presented by A. D. Blackader.[2] This large area of country is divided into the eastern, western, prairie and northern districts. Halifax and Frederickton, Montreal and Toronto represent the eastern district. Halifax and Frederickton are in a milder section, owing to the nearness of the sea; the summer is cooler, the winter less severe. The rainfall varies from 30 to 50 inches. Statistics gained from hospitals in this area show the incidence of lobar pneumonia to be about the same as elsewhere. Complications of pleural effusions, empyema, pericarditis and nephritis are more frequent.

In the prairie district of Alberta and Assiniboine pneumonia is frequent. Statistics give its death rate of 9.3 per cent., greater in the spring and summer. Here there is much extreme of temperature and great variability. Spring opens early, and in some localities the Chinook winds keep the snow away.

The western district is that beyond the Rockies. It has great diversity of climate, with rainy and disagreeable winters. There are no statistics for either this or the northern district at present. The latter is sparsely settled, and presumably from reports pneumonia is rare.

Effect of Climate on Metabolism.

J. B. Nichols[3] presents the complex subject of the influence of meteorologic and climatic conditions on metabolism. Metabolism consists largely of two sets of processes, thermogenesis or heat-production, and thermolysis or heat-dissipation. Oxidation of food or body substances produces heat. If the ideal dietetic conditions existed energy would be wholly produced from food, none would be drawn from the body. Heat-regulation is brought about by a balancing of production and dissipation, through the nervous mechanism, so that the body temperature is normally fairly uniform. The production of heat is largely dependent on the elimination of heat, as this in turn is profoundly influenced by the external conditions about the body, so that

(2) Trans. Am. Climat. Assoc., 1909.
(3) Trans. Am. Climat. Assoc., 1909.

these atmospheric conditions indirectly control body oxidation.

The main avenues of escape for heat are: (1) Radiation and conduction. (2) Vaporization of water. (3) External muscular work. Through the first means the body continuously imparts heat to the air and surrounding objects. Through the second it continuously changes the water secreted from the skin into vapor that passes into the air. Each gram of water requires 0.592 of a calory of heat from the body to make the change to vapor. This uses a large amount daily. The efficiency of the body as an engine has been determined to be from 13 to 20 per cent.; that is for every calory of energy expended in work 4 to 6 calories of heat must be disposed of.

Atwater and Benedict have shown that at rest the body produces 2,258 calories daily, at work 5,179 calories. Of these about 5 per cent. are disposed of by radiation and conduction, 22 by vaporization of water at rest, 15 in action, the difference appearing as muscular work, 10 per cent. Thus the conditions affecting the escape of heat from the body are the most important to consider. These are temperature, humidity and wind.

With a low external temperature there is a constant rapid loss, compensated for by greater production of heat in the body. With a rise in surrounding temperature the production of heat is lessened to correspond with the lessened conduction and radiation. When external and internal temperature are equal heat-elimination by radiation ceases; all loss must be by evaporation. Experiments show that the total bodily oxidation decreases as the surrounding temperature rises to about 33° C. Above this the overwarming of the body cells causes increase of oxidation. Atmospheric temperature has a reverse action on vaporization; increased temperature causes increase of evaporation and increase of heat-loss. The influence of external temperature on metabolism has been shown by experiment. Nitrogen metabolism is unchanged, the heat-producing elements being the ones affected.

Humidity influences the body heat mainly by influencing the evaporation of water; dry air increases, damp air lessens it. Cold humid air favors loss by increased conductivity of the damp clothing. Total oxidation is increased

by humidity, warm or cold. Warm humidity overwarms the cells by lessened loss due to less evaporation; cold humidity increases oxidation in compensation for the increased loss of heat by conduction. Winds markedly favor heat-loss by radiation-conduction and by evaporation. In an air saturated with moisture and at body temperature all loss of heat is blocked. This leads to a rise in body temperature and the condition is most dangerous.

The factors of hygiene and diet that influence body heat were not discussed in this paper. Obesity also has its influence. These considerations indicate the need of a generous diet in cold climates, but the nitrogenous food need not be increased; fats and carbohydrates are quite sufficient. In hot, humid weather, heat-elimination must be amply provided for. The diet is not the greatest factor, but as it does to some degree increase oxidation it can be adjusted somewhat to the weather.

Weather and Suicide.

The seasonal influence on suicide is discussed by W. F. R. Phillips.[4] In London statistics form a curve with its apex in May and June and its lowest point in December, January and February. In Ireland, Saxony, Austria, Sweden and the Netherlands May is the maximum; France, Italy, Norway, Belgium and Denmark have June; Switzerland, Bavaria, Wurtenburg and Baden show their largest numbers in July. Japan follows about the same distribution as does Western Europe. This gives two distinct phases in two parts of the year. Different explanations have been made of these facts, but to understand the subject fully, the statistics must be critically analyzed.

Strahan has made an excellent working classification of suicides into three kinds:

1. Cases with mental aberration.
2. Cases with an irresistible impulse but no mental aberration.
3. Cases with a predisposition that is easily aroused by shock, trial or irritation.

All acts of violence show this same seasonal variation. Loss of self-control is largely the cause of these deeds.

The author offers two suppositions, one based on the

(4) Trans. Am. Climat. Society, 1909.

idea of a cumulative irritability of the nervous system due to an extensive and continuous low grade irritation of the skin, the second on a possible effect of the annual variation in the quantity and quality of daily diet. Both of these conditions are the result of seasonal changes and rise and fall of temperature, more than of any other single climatic cause.

The cutaneous area influenced is large, and statistics have been collected to show that high humidity and high winds cause an increase of suicides. [Some authorities claim that slight wind increases them.—Ed.] The myriad impressions coming from the skin, mostly subconscious, making for bad feeling, become cumulative and throw the unstable systems off their balance, and self-destruction results. So also the system suffers from the monotonous food. In late winter and early spring this influence becomes cumulative and the system is lowered in its vitality in consequence. Fresh fruits and vegetables and fresh meats are reduced in many households during these late winter and spring months. This influences profoundly the metabolism of the organism and may have far reaching results.

Roland G. Curtin[5] has made a study on the *Influence of Climate upon Suicide*. Apart from insanity and climate the most important factors are religion, race and heredity, education, age, life insurance, diseases, lack of domestic life, occupation, degeneracy, alcoholism, rural or city life and sex. Of these, religion is a deterrent, also sex, women being less prone to commit suicide than men. Disease, if casual, increases, but outbreaks of pestilence decrease suicides. Occupation that employs the mind prevents the act. Of the rest, heredity, if bad, education, age, alcoholism, city life are potent factors for increasing self-destruction.

Numbers of observations have been made as to the frequency of suicide in conditions of heat, cold, wind, moisture, dull and sunny weather in various countries and the following results are deduced.

1. Climate has an effect, for the temperate regions show more suicides than the very hot or very cold.

2. Low barometric pressure prevents it, also precipitation.

(5) Trans. Am. Climat. Soc., 1909.

3. High temperature increases suicides, the number of cases grows larger as summer approaches.
4. Before storms and during mild winds they increase.
5. During high winds they lessen.

The Relation of Climate to the Treatment of Pulmonary Tuberculosis.

Although covering many topics considered in previous volumes of the PRACTICAL MEDICINE SERIES, a public health bulletin by Passed Asst. Surg. F. C. Smith[6] on the relation of climate to the treatment of consumption, gives such a good resumé of the present views of authorities on this subject, that it is here given entire.

Tuberculous patients are sometimes puzzled by conflicting medical advice on the subject of climate in its relations to the treatment of their disease. It is not surprising that diverse opinions prevail. From very early times the cure of tuberculosis has been associated, more or less, with certain places, and, as Klebs says: "At one time or another, almost any combination of known atmospheric conditions was considered to constitute a climate which had protective or curative qualities for consumptives." The reason for this is found, of course, in the fact that pulmonary tuberculosis is a chronic disease, depending for arrest upon a large number of factors, many of which are independent of atmospheric conditions and common to all climates.

Another thing which has added to the confusion of ideas on the subject has been the search for "immune zones," regions where tuberculosis is rare or absent, the inference being implied that such places offer climatic conditions useful in treating the disease. No region, however, has long continued free from tuberculosis after being reached by modern civilization. Remote districts became infected rapidly as soon as the disease was introduced. Thinly populated areas, whatever their geographical position, become tubercularized wherever cities are built and confining trades established. Latham states that tuberculosis is rife amongst the watchmakers of the high Alps. The death rate from tuberculosis among our native Indians is not appreciably less in those tribes which have always lived in the

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arid Southwest and other favorable climates. Neither the salts in sea air, the ozone of forests, nor the rarefied atmosphere of mountains are remedial in themselves; they simply typify an outdoor life. Physicians are practically agreed that there is no specific climate for tuberculosis.

But, beyond all question, an open-air life is more pleasant in some climates than in others, and an open-air life in varying degrees of rest and activity is one of several important elements in the proper treatment of tuberculosis. The gain in comfort and thoroughness with which an outdoor existence can be followed in selected climates and the relation of certain complications to special atmospheric conditions must be considered against a possible loss in the facilities with which other essential therapeutic measures will be carried out.

The following expressions are representative of recent medical opinion. Dr. E. R. Baldwin, Saranac Lake, says that change of climate is often of great value, but is not a necessary thing in all cases. It is largely dependent upon the means of the patient and also upon the environment at home. A change to a higher altitude and a more invigorating atmosphere is nearly always advantageous where the means are sufficient and proper supervision can be obtained. Experience shows that a minimum of $10 a week is required for the expenses of patients in most of the health resorts, unless they can enter a semicharitable sanatorium. Hence it is inadvisable for patients who are unable to command the above sum to leave home.

Hillier, of London, declares that climates of every variety have at one time and another been recommended for consumption: High altitudes and the seaboard, warm climates and cold ones, the ocean and the desert, the equator and the poles. The underlying truth is at last being recognized. The chief virtue of these resorts is the open-air life.

According to Lawrence Flick, of the Henry Phipps Institute of Philadelphia, expert medical advice is the most important factor in effecting a cure, and doctors at home are now as well up on the disease as doctors at climatic resorts, though formerly this was not so. A long period of treatment is required, no matter where undertaken, and proper treatment at a distant resort is prohibitive for the poor, and often embarrassing for the well-to-do. He de-

sires to go on record as believing that there is no therapeutic value in climate.

Anders, of Philadelphia, says that experience and observation have shown that certain climates, selected with particular reference not only to the stage of the affection, but more particularly to the individual, are useful modifying influences of the tissue soil. In any case of tuberculosis that climate is most suitable in which the patient "feels well, eats well, sleeps well, and gains flesh and strength." (Delafield.)

Latham, of London, states that the results of sanatorium treatment in a variety of climates show that the old ideas of a particular climate or altitude being a specific for pulmonary consumption are erroneous, and have proved that climate is only one, though an important, factor in the treatment. Most physicians who have had much experience of sanatorium treatment, and who have watched patients for some years after their return from a sanatorium, agree that as far as possible *all patients should be treated under the same climatic conditions as those which they are likely to experience in their subsequent life.* (Italics are Latham's.)

Minor, of Asheville, N. C., in an article for popular use, says: "If you have money enough to go away to a favorable climate and get there good board, care, and accommodations, it will be a great help to you; but *change of climate is not the first or most important thing,* and, unless you have money enough to get in the climatic resort as good or better conditions than you have at home, you had much better stay at home and spend what money you have in getting the best possible conditions you can there." (Italics are Minor's.)

Osler, in his Practice of Medicine, writes as follows: (c) *Climatic treatment.*—This, after all, is only a modification of the open-air method. The first question to be decided is whether the patient is fit to be sent from home. In many instances it is a positive hardship. A patient with well-marked cavities, hectic fever, night sweats, and emaciation is much better at home, and the physician should not be too much influenced by the importunities of the sick man or his friends.

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"Very much is said concerning the choice of locality in the different stages of pulmonary tuberculosis, but when the disease is limited to an apex, in a man of fairly good personal and family history, the chances are that he may fight a winning battle if he lives out of doors in any climate, whether high, dry, and cold or low, moist and warm."

Dunham, 1904, after visiting discharged Massachusetts Sanatorium patients in the West, and upon comparing Massachusetts Sanatorium statistics with those of the United States Army Sanatorium at Fort Bayard, New Mex., said: "The results corroborate our belief in the efficacy of residence in dry climates, but with a smaller margin in its favor than was anticipated. * * * The proportion of people adapted for treatment in these extremes of climate must be more nearly equal than thought possible by climatologists generally. That is to say, a small majority of the patients at Rutland would probably do better at Fort Bayard and a large minority there might do better here.

Francine, of Philadelphia, affirms that at first and for a considerable time mountainous regions or high altitudes were considered essential sites for sanatoria, as the potency of climate *per se* was exaggerated or at least not rightly understood. Nor can this question be considered settled even to-day, though it seems probable that the importance of the other factors in sanatorium treatment, *i. e.*, rest, fresh air, diet, and regular regimen, are receiving juster appreciation than heretofore. The feeling seems to be gaining ground in the profession that it is not so much a particular climate which accomplishes results as it is fresh air, and plenty of it, in association with the other factors of modern treatment. * * * The view is held by some with wide experience to substantiate their claims that change of climate is unnecessary and even inadvisable, and that quite as good results may be obtained by treating the patient in his own home: these latter enthusiasts have swung completely over, and disregard climate while emphasizing the importance of care and treatment. It seems probable that the just view lies somewhere midway between these two extremes.

Bonney, of Denver, says that the prevailing tendency to provide home sanatoria for all classes and repudiate established facts of climatic influence is to be deplored. Climate

is a valuable adjuvant to other measures of therapeutic management, but the same watchful observation by an expert physician is necessary for good results. Choice of a climate is a delicate and important matter. In all cases climatic selection becomes for the patient a question of individual fitness. The last 313 cases coming under his personal observation in Denver included 90 of doubtful diagnosis and 125 others unsuitable for the change of climate on account of the complications or advanced and rapidly progressing disease.

Pottenger, of Monrovia, Cal., writes as follows: "Given the same treatment, climate is valuable. Patients of small means should remain at home under intelligent guidance instead of stinting themselves in a better climate. Favorable climate is not essential, but it makes the cure easier, and at the same time favors it."

Bowditch, V. Y., of Boston, declares that it is equally foolish to say that it is no longer necessary to send patients to a distant clime and that every patient must go far away to regain health.

Knight, of Boston (deceased), is quoted as saying: "Undoubtedly there is something in climate influences. I am sure there can be no contention as to the advantages of certain forms of climatic treatment in connection with other methods of personal hygiene."

Knopf, of New York, declares that the value of certain climatic regions in the treatment of pulmonary tuberculosis, particularly of high and dry climatic resorts, must be acknowledged. A change of climate is nearly always good, except in the very latter stages of the disease, when it should be made only in case of a well-to-do patient and upon his expressed desire. Even a change from a good to a seemingly less favorable climate may accomplish a certain amount of good. The danger of relapse is greater to those returning from distant resorts after a short sojourn, before they have become thoroughly acclimated or their disease cured or arrested. Suitable and beneficial differences are not infrequently found in climates very near home. Thus, for example, a removal from New York slums to North Brother Island, within the city limits, constitutes a climatic change beneficent to the majority of indigent cases.

In the selection of climate for a tuberculous patient, his likes or dislikes for warm or cold weather, or his possible idiosyncrasies for high or low altitude, and the presence of chronic dry or moist nasal catarrhs must be taken into consideration, those with dry catarrhs usually doing better in relatively moist regions and *vice versa*. The majority of tuberculous patients (particularly those coming from the laboring classes) should, if at all possible, be treated in climates where they will have to live and labor after their restoration to health.

The Importance of Climate Compared with That of Other Therapeutic Measures. The most important factors in promoting recovery from pulmonary tuberculosis are:

1. *Adequate and intelligent rest.*
2. *Proper and sufficient food.*
3. *Abundance of pure air.*

It would be difficult to name the relative values of these factors. No one of them is essential in all cases, for recoveries occur under very unhygienic conditions. Various pathologists estimate that 50 per cent., or even more, of infected people recover without knowing that they have had a serious disease. But for those who come to a doctor and in whom the disease is discovered, such spontaneous recoveries must be ignored, and rest, food, and air prescribed according to the patient's financial condition.

Obviously all are not equally able to afford these things. Comparatively few of those suffering from tuberculosis can realize ideal conditions for recovery. A limited purse can procure rest for a limited time, or in inadequate degree, and fresh air is often expensive just as is choice food. Fresh air is expensive in the city, because it means proper housing in a good location. How much that costs in a city like New York, for instance, is readily understood. Removal from the city entails an initial expense, with, perhaps, business sacrifices for the earning member of the family. Additional clothing required to protect the body from cold adds to the expense of fresh air. Just as the circumstances of a patient may prevent him from securing the best house or the best food, so he may not be able to get the best fresh air, *i. e.*, the best climate. If we grant that there are differences in climates, just as there are dif-

ferences in houses, still, excellence of climate is no more essential to a cure than excellence of some other things, and there is no climate so good that it will always make up for increased work or poorer housing, or scantier fare, if necessitated by a change.

Each case should be decided on its own merits, and where sacrifices must be made they should be duly apportioned, both in regard to the immediate and also the remote aspects of the case. For one with fever, sweats, and rapid wasting, absolute rest in bed, with good ventilation and good nursing, is an immediate necessity, outweighing other considerations. On the other hand, unfavorable climatic conditions, such as oppressive heat, irritating dust or smoke, extreme cold, or an atmosphere of melting snow and constant fog may exercise such a bad effect on a case fit to travel that a suitable change of climate becomes an urgent necessity and should be undertaken, even at considerable sacrifice.

The wealthy, who are able to surround themselves with comforts and can command expert service wherever they go, may seek a change whenever it is indicated, weighing only the ill effects of a journey against the natural advantages of the place selected. Besides the wealthy, there is a class following occupations which allow a transfer from one region to another with little sacrifice of means. Railroad employees in certain capacities, telegraph operators, etc., and government employees in some departments, are often able, by the courtesy of their superiors, to effect a transfer of their duties to a climate more favorable to themselves or to a tuberculous member of their family. The three great medical services of the Federal Government, the Public Health and Marine-Hospital Service and the medical departments of the army and navy, have selected for their respective sanatoria locations in the arid Southwest, in what was adjudged the most suitable climate for young, adult males. But in locating state and municipal sanatoria the governing boards have in each instance chosen a site within their own domain; economic considerations, accessibility, and opportunities for administrative control outweighing any increased therapeutic value a distant climate might have afforded. The majority of patients will be in the same relation to their families that the public

sanatorium bears to its State and the same economic principles will usually apply to the disposition of the case.

Preliminary Observation and Study of Case Before Advising Change of Climate. As a routine procedure, the practice of advising a change of climate to a distance is unwarranted. The consensus of opinion is that certain changes are desirable in certain cases, but precipitate haste in ordering a patient away is a mistake. Sometimes a change is either unnecessary or useless, and moreover, a climate adapted to the needs of one individual may be wholly unsuited to those of another.

The doctor who habitually prescribes a distant removal is usually one who still harbors the idea that there is a specific climate for tuberculosis. Such a physician is an exponent of some particular region, from fashion or caprice or from lack of knowledge of other places. The old adage "Consumption, therefore creosote or Colorado" is equally expressive of therapeutic and climatic ignorance. The reproach so frequently heard from resort specialists that patients are not sent early enough, that the family doctor holds them too long, has probably done more harm than good. The case that should be sent to a distant climate immediately upon diagnosis is exceptional, nor should neglect to make an early diagnosis stand sponsor for precipitate haste in sending the victim away when it is finally established. At the Marine-Hospital Sanatorium, Fort Stanton, N. Mex., the results have been nearly three times as good in the cases which left the home stations, *i. e.*, the local marine hospitals, without fever, as in those who had a temperature of 38° C. or more within two weeks of departure. The deaths in those leaving afebrile were to those leaving with fever, as 22 to 59, the arrests as 19 to 74, the apparent cures as 10 to 3. (Nomenclature of the National Association in use at this station.) A period of observation is frequently desirable in order to exclude hopeless cases, and that an intelligent selection of climate may be made if a change is needed, the character of each case offering its individual indications.

But there should be no delay in instituting the regimen upon which a cure will depend, no matter where undertaken, whether a removal is contemplated and whether the time set for departure is near or remote.

Hopeless Cases Not to be Sent to a Distance. It is not always easy to determine when a case of pulmonary tuberculosis is hopeless, but in general the far advanced case that does not offer some hope of temporary arrest in the home climate, when treated in a local sanatorium, or under other favorable conditions, can not be expected to improve under the same conditions after a long journey, no matter what the difference in climate. A progressing case of long standing, with abdominal organs already damaged by terminal changes of the disease, and dependent on nursing for comfort, is in no condition to be benefited by a change of climate. Occasionally a critical case recovers or life is prolonged beyond all expectation in a health resort, but the same thing occurs in similar cases in home climates. In the elevated western regions, so frequently selected, a patient grows worse faster or improves faster, as the case may be, than in less stimulating climates. At the Marine-Hospital Sanatorium, Fort Stanton, N. Mex., there were 84 deaths within one month of arrival, and 203 in from one to six months after arrival, out of a total of 521 deaths. It makes little difference to a dying man what the climatic conditions are so long as he has proper care. A few hours of extra sunshine per day or a decreased amount of precipitation have not the same value to a moribund case that they have to one less ill. Unfortunately, the evil results of exiling the hopeless cases are not so apparent to those responsible for it as to those among whom the unhappy sufferers go, for there is no picture more miserable than the boarding-house life of a consumptive, hopelessly ill among strangers. An inquiry made by the National Association for the Study and Prevention of Tuberculosis has convinced its executive office that over 7,000 hopelessly ill consumptives are annually sent to the States of California, Arizona, New Mexico, Texas, and Colorado, and that of these over 4,000 are practically indigent.

The Psychologic Moment for Change. Almost any case of tuberculosis which may be expected to result favorably, as well as many hopeless cases, will, when kept in bed in freely flowing air anywhere, improve for a time and up to a certain point. "As a rule, indeed, routinely, it is best to carry the patient as far along the road to health as seems possible (within certain limits) by treatment at

home, at least to relieve all symptoms so far as may be, before contemplating a change. After comparative quiescence of the lung process has been reached under treatment at home, and the nutrition is much improved, there comes a stage where further improvement is slow. This is the psychological moment for change. In speaking of change I mean a complete change to health resorts in the far West; or those in the East at considerable distance from the patient's home." (Francine.)

It can not be too frequently repeated that each case must be decided individually. A delicate, anemic woman who feels the cold keenly and can not be trained to face veranda life in the damp rigors of a New England winter, is so much benefited by a sojourn of three months in some southern winter resort where outdoor life can be comfortably followed that the advantages of the temporary change outweigh the pangs of homesickness. One with flagging digestion and relaxed nervous and vascular system, sweltering in the heat of a southern July, may find a removal to the sparkling air of some elevated western region or even to the invigorating atmosphere of a cool beach resort a life-saving measure.

General Aspect of the Invasion. The amount of lung tissue involved is by no means the only thing to be considered. Frequently the finding of tubercle bacilli in the sputum of a man coming to his physician with no serious symptoms causes the case to be referred to a specialist in diseases of the chest who elicits the history of an unrecognized attack of tuberculosis occurring several years previously, and finds, clinically, an arrested process. The pathological condition may correspond to that of a case just returned from a successful period of climatic treatment. Obviously, such a newly diagnosed case is not subject to the same rules as certain others. Again, the presence of a small area of active disease in one part of a lung, showing arrest in other parts, may put the case in the same class as an incipient attack. Or the presence of terminal changes, fatty kidney, amyloid liver, etc., from long standing tuberculosis, may put a case with even a slight degree of activity in the class with those hopelessly ill. Moreover, certain types are florid from their onset, the so-called pneumonic cases, as well as the miliary

variety, and it is certain that the influence of climate is practically negligible in such acutely progressing disease. For certain complications, skillful treatment by an appropriate specialist is so important that all other considerations may be disregarded for the time and the most skillful service sought, regardless of climate. In general it may be said that any complication which confines the patient in bed is best met where the best nursing facilities are to be found.

The Local Sanatorium. A preliminary observation for a few months in a local sanatorium is invaluable in determining the character of a recently diagnosed tuberculosis. The number of these institutions is increasing almost daily and within a few miles of any large city will be found charitable, semicharitable, and private fresh-air hospitals for any class of cases. Here an idea of the resistance of the individual and the indications to be met can be obtained. The habits of life which that consumptive must observe who will either live with or cure his disease in any climate are best learned in such an institution where the inmates are devoted to the business of getting well. There is, in a well-ordered sanatorium, an esprit de corps among the patients themselves, an intelligent, buoyant, helpful co-operation not altogether unlike college spirit, and the special training afforded in a vital matter in such a place may well liken the sanatorium to a school, as, indeed, it is. North Carolina has recently changed the name of her state sanatorium to the State Training School for Tuberculosis.

The position of a specialist in diseases of the lungs is analogous to that of a surgeon, and for the best results the former should often be consulted just as, in another class of diseases, the latter would be. A surgeon, competent for ordinary emergencies, can be found in any, even the smaller cities, but while special training in pulmonary tuberculosis is rapidly developing and in a few years will be easily available in any part of the country, it has now often to be sought for in special places, and the sanatorium is one of these.

The General Practitioner's Point of View. The family doctor, having made a skillful diagnosis, absolute or provisional, is immediately confronted with the question,

what are the best opportunities for recovery which this patient's means will allow? For, as Edson says, "the best he can get is what we must order, both as regards food, bedroom, and quality of air." If the case is in a family of wealth, his task is simplified, as he has merely to decide whether a change of climate is necessary or justifiable and the nature of the change indicated, and may give his advice accordingly, knowing that adequate means will everywhere command skilled service, home comforts, solace, and diversion. In the vast majority of cases, however, he must weigh the benefits of a change against certain sacrifices usually necessary to effect it, and here must be considered a multitude of details, some of which the family doctor is in a position to decide upon better than anyone else and some of which, without special training in tuberculosis, he will make a mistake in attempting to decide. Even when treatment in the home climate has been decided upon, there are some who insist that their patient enter a local sanatorium for several months for the preliminary training necessary to a successful regimen at home.

If the case has a favorable outlook and a good chance to recover in the home climate, the fact often remains that there would be a still better chance in some other climates. He desires to prescribe nothing short of the very best conditions. He recalls too, that a "change of climate" is time-honored advice, the patient expects it perhaps, and there will be less responsibility for an unfavorable outcome if he gives it. He may measure the vexations of home treatment against inadequate fees, and remember that he has even been accused of mercenary motives in holding certain favorable cases for home treatment. It must be confessed that it requires considerable courage for a physician to recommend "no change," and it can be said without equivocation that the family doctor who undertakes to treat a case of pulmonary tuberculosis in a home of any kind is guided by duty and altruism and not by the financial aspects of the case. The layman, always following medical teaching of a decade previous, is more ready to do "some great thing" than to bathe seven days and nights in the week in the out-door air of home. Indications for or against a removal are found in the home itself. A nervous man or woman may need to be taken from a turbu-

lent household of lusty children, while for a differently constituted case congenial relatives are indispensable for content. Extreme measures are sometimes necessary to get a careless patient away from helpless associates, or, on the other hand, to save an invalid from false ideas of treatment at the hands of ignorant relatives.

Moreover a multitude of counsel confuses the busy practitioner. The resort specialists, each perhaps convinced of the excellence of a particular climate by a self-cure there, urge the merits of various regions. They insist that the case be sent without dalay, fix two to five years as the probable duration of treatment, and perhaps raise a question at the same time against the propriety of an ultimate return to home climatic conditions. Moreover he has been convinced that hygiene and good medical attendance are as necessary in the new climate as the old, and that the claims of a sanatorium are as strong in a distant health resort as they are in the home city.

He can recall some sad experiences of previous days when his early cases went West to "rough it," or of later ones where patients thought that they could loiter in smoky lobbies and attend the evening dances and effect a cure simply because they were breathing the pure air, or the rarefied air, or the dry air of some widely advertised "climate."

But it is often easier to persuade a patient to enter a sanatorium at a distant resort than a similar one near home, and sometimes an adult male can be persuaded to abandon his business pursuits only by radical removal from the scene of his activities. Especially is this true of physicians. The stimulation of hope afforded by a complete change is frequently needed where a patient has met repeated reverses in his own case or has seen unfavorable outcomes in a number of friends or relatives. With all this the family doctor must study the tastes and habits of his patient. The indications for change are different for a home-loving, carefully nurtured girl than for her bachelor brother. Young adults often welcome a change, whereas one past middle life, with strong attachment for home scenes, may consider it a hardship. For the very young or the very old a removal simply for change of scene would almost never be indicated.

Temperament and previous climatic environment are important. One would not, for instance, send a Norwegian youth to the Azores nor a Creole demoiselle to winter in the Adirondacks. A thin, irritable person, who shrinks at sudden drops in temperature, would not be advised to go to Colorado, nor would a full-blooded, lusty individual ordinarily be directed to San Diego.

In deciding whether a case of pulmonary tuberculosis should have a change of climate, temporary or permanent, remote or near, the doctor must not be bound by any rule, but be guided in each case by all the attending circumstances—by the patient's age, sex, and social condition, wealth, temperament and desires, by the stage and activity of the disease and its complications. He will be influenced by the home climate and the season of the year, but it is safe to say that no place is so unfavorably situated that a general recommendation for change can be made, and none so fortunate in its location as to preclude the possible advisability of a removal.

Home Climates. Local weather conditions at certain seasons may strongly indicate a temporary removal from some localities. When crowds of well people press out of a hot city to the nearest cool resort the doctor may well cast about for similar relief for his consumptives. The most frequently indicated change is one to avoid excessive heat, for it is now realized that, making allowance for idiosyncrasy, cold air is especially stimulating to metabolism and, therefore, peculiarly suitable to the treatment of pulmonary tuberculosis. The tonic effects of cold air with increased appetite and power of assimilation account for much of the good results ascribed to the dryness and elevation of Colorado. Most city dwellers know of some near-by country resort where comfort is increased during the summer months, and, with the consumptive, as with others, comfort is the chief motive for a change. There are few parts of the United States so situated as not to have within comparatively short distances places with climatic conditions so different as to constitute a marked change, and as J. C. Wilson, has said, "It is sometimes not so much the climate to which the patient goes as the climate from which he is taken." The change from a hot city to a cool country place may be as radical as a

removal from a suburban mansion to New Mexico plateaus.

Within a few hours' ride of any large city can be found comfortable resorts. The mountains of the Virginias and Pennsylvania are especially rich in places where, with proper medical attendance, favorable climatic conditions for consumptives are found. The climate of the Adirondacks is only representative of the wooded country of that latitude. Almost every State on the Canadian border has forests at moderate elevations where, with only occasional extremes of temperature, a stimulating atmosphere lends comfort to an outdoor life.

The Central Plateau of Massachusetts, described by Getchell, of Worcester, embraces 700 square miles and bears a score of small cities, all at an altitude of 1,000 feet or more. In one of these, Rutland, the state sanatorium is located, and from this place, as well as from Petersham and Templeton, Mount Greylock in the Berkshires, 60 miles away, can be plainly seen (Doctor Getchell estimates) as many as sixty days in the year. In view of the accessibility of this region and the excellent results obtained at the state institution, it is gratifying that numerous private sanatoria are being opened there.

Ulster, Greene, and Sullivan counties around New York city are frequently mentioned as containing many desirable locations for consumptives. Judd, of Philadelphia, describes a plateau 1,800 to 2,000 feet high in Monroe County, Pa., conveniently near several of the largest eastern cities, and, as is well known, there are hundreds of cool beach resorts from Maine to far south on the Atlantic seaboard. Asheville, N. C., well known as a health resort, is illustrative of the stimulating climate of the mountainous regions of North Carolina, Tennessee, and Kentucky.

Moreover, it should be remembered that there is no ideal all-the-year-round climate for the average consumptive. Physicians of Denver sometimes send patients out of that city into neighboring mountains during certain months of the year to avoid unfavorable weather conditions. Craig, of Phoenix, suggests that all-the-year health seekers in Arizona should spend summer in Flagstaff, fall in Prescott, and winter and spring in Phoenix. Cli-

matic conditions vary greatly within short distances, not only in California and Colorado, but also in many Eastern States, where mountains are found near the ocean.

There are certain advantages in undertaking the cure in one's own home climate, and by this term is usually meant places not more distant, for instance, than the confines of the home State. The limitations of one's own climate are known and will not be presumed upon, whereas the faith inspired by a removal to some specially selected climate often weakens the regimen which is necessary anywhere. Moreover, a return to home climatic conditions is more apt to show a lapse from the careful hygiene which was followed with comfort in a favorable spot but seems a hardship in more rigorous climes. As Hillier says, "The man who has braved wind and weather in an English or German sanatorium will more readily stay out of doors and open his windows when he gets back to every-day life at home than one who has just returned from the Mediterranean or the cape."

The short-distance change is admirably adapted to the needs of the average individual for whom a removal from business cares or unfavorable home surroundings is indicated. It is probable that the advantages of near-by resorts have not been fully realized by busy, general practitioners, and the therapeutic value of such changes has been lost sight of in radical removal to a distant climate. But climatic therapeutics are not exact. Indeed, as Anderson, of Colorado Springs, has said, "The matter of climate is largely one of experiment." A short-distance change is obviously a less costly experiment than a long-distance change.

The following list, perhaps incomplete, showing location of various state sanatoria is added, because, when intelligently selected, such sites are representative of the healthful regions of a State. The superintendent of such a public institution is also in a position to know the location of private sanatoria in his neighborhood, and is more or less in the habit of answering inquiries concerning the tuberculosis situation in his own State.

Arkansas: Boonesville (not completed).
Delaware: In the Brandywine Hills near Wilmington.
Georgia: Alto (not yet built).
Indiana: Three miles east of Rockville.
Iowa: Five miles northeast of Iowa City.
Louisiana: Covington.
Maine: Hebron.
Maryland: Sabillasville, Towson, and Mount Airy.
Massachusetts: Rutland and North Reading.
Michigan: Howell.
Minnesota: Walker.
Missouri: Mount Vernon.
New Hampshire: Glencliffe.
New Jersey: Glen Gardner.
New York: Ray Brook.
North Carolina: Montrose.
Ohio: Mount Vernon.
Pennsylvania: Mount Alto and Cresson.
Rhode Island: Pascoag.
South Dakota: Custer (not yet built).
Vermont: Pittsford.
Wisconsin: Wales.

Special Climates. The practice of sending consumptives away to high altitudes is fraught with greater possibilities for good or for evil than any other change commonly made. Such places in the United States are dry, cool, and stimulating, with a large number of clear days and a maximum of sunshine. Concerning the therapeutic effects of diminished air pressure itself authorities differ, some holding it to be indifferent, others assigning it a positive value in dilating the air vesicles and increasing pulmonary circulation. Still others, while granting that many cases are benefited by such climates, believe that a rarefied atmosphere may be harmful in so far as the deeper breathing required is opposed to pulmonary rest and assists in breaking down existing consolidation. All agree that there is a large number of contra-indications to high altitudes, and the following is a list of those for whom such a change is usually considered unadvisable: Those of low vitality and with poor circulation; the old or middle-aged with declining powers of heat-production; the erythric, neurotic individuals, or those with irritable temperaments; all with acutely progressing disease or those who can not attain even a temporary arrest in the home climate; very far advanced cases with much destruction of lung tissue, resulting in dyspnea (fibroid type included); those with dilatation

or nervous derangement of the heart and certain forms of uncompensated valvular disease; and cases complicated with diabetes, nephritis, emphysema, dry catarrh, or much bronchial irritability. For young adults without any of the foregoing complications who can and will secure proper medical attendance and submit to the same regimen that is necessary to effect a cure anywhere, the high, dry climate is the best. It has its dangers, one of which is the sense of well-being which may betray one into pernicious activity. It will frequently revive a jaded appetite or mitigate a troublesome moist catarrh at once, and it will add zest to life, but it will not insure recovery in every case and is not a short cut to health. Of the first 1,754 patients admitted to the Marine Hospital Sanatorium at Fort Stanton, N. Mex., 524 have died there, but a large number of these would not, in the light of present knowledge, be considered suitable cases for transfer, and it may be added that in the interest of the public health it is the policy of this institution to encourage hopeless cases to remain, unless the interests of the individual are best served by returning him to lower altitudes.

The following list of places with altitudes between 4,000 and 7,000 feet is believed to represent fairly well the high, dry climate, but is of course only suggestive of locations to be sought:

In Arizona, Flagstaff, Oracle, and Prescott; in Colorado, Boulder, Brush, Canon City, Colorado Springs, Denver, and Glenwood Springs; in New Mexico, Alamogordo, Albuquerque, East Las Vegas, Las Vegas, Lincoln, Santa Fe, and Silver City; in Texas, Alpine and Marfa; and in Wyoming, Cheyenne.

At moderate altitudes in the arid Southwest are many localities characterized by all the attributes of a dry climate. During the summer months these places are less comfortable than the more elevated ones just mentioned, but the winter nights are less severe at lower altitudes. Both are about equally subject to the dust-storms of this region which occur occasionally, chiefly in March and April. The following places, all at altitudes between 2,000 and 4,315 feet, typify this climate: In Arizona, Castle Creek and Tucson; in New Mexico, Carlsbad, Dem-

ing, Las Cruces, and Roswell; in Texas, Boerne, and El Paso.

Warmer, less stimulating, more equable, and more humid, suited (especially as winter resorts) to those less robust and adapted to the needs of some for whom elevated regions are contra-indicated, regions of less than 1,000 feet elevation, are exemplified in Aiken and Camden, S. C.; Augusta and Thomasville, Ga.; Llano and Columbus, Tex.

As typical of the warm, humid, equable climate should be mentioned Hawaii, certain parts of Florida and the coast of southern California, and as winter resorts and for those with nephritis and advanced fibroid changes, as well as for the aged and cases complicated with excessive bronchial irritability, this type of climate is useful.

No consumptive should start for a health resort without first satisfying himself that he will be able to provide himself with suitable accommodations there. Certain places, notably in Texas, have been filled with indigent cases from the East who have severely taxed the patience and resources of the residents. Generalizations on climate are never of much value and each place must be judged by itself. The National Association for the Study and Prevention of Tuberculosis publishes a directory of institutions for tuberculosis in the United States and Canada, and its official organ, The Journal of the Outdoor Life, 2 Rector street, New York, courteously states that its service department "will furnish, without charge, information about sanatoriums, boarding houses, health resorts, and such other data as it has on file."

Fresh-Air Treatment of Insanity.

A note on the fresh-air treatment of acute insanity is made by Sanger Brown.[7] During the early weeks of acute insanity if patients are noisy and wakeful, rooms with thick, deadened walls, double doors and windows and forced ventilation have been used for four years. They have an independent inlet and outlet flue and can be ventilated by using the gravity system if there is nothing to deflect air currents about the building. During the sum-

(7) Trans. Am. Climat. Assoc., 1909.

mer months a noiseless electric fan should be put in the outlet flue.

The author has come to consider the fresh-air treatment indispensable in certain forms of insanity. If the patients are quiet enough to be left out-of-doors, open pavilions facing south with concrete floors and walks are well suited for use. They are always dry, and in the winter foot-warmers can be supplied. The free, fresh air promotes great vigor, sleep, appetite and digestion in these cases as much as in tuberculosis, and so hastens recovery from these acute conditions. While hypnotics and sedatives may be sometimes required, on the whole far less is needed under the fresh-air treatment, and the disturbance to the system caused by the continuous use of drugs is avoided. Any establishment devoted to the treatment of acute insanity should have noise-proof rooms with forced ventilation, and also open porches, so as to give the patients every assistance to recover in as short a time as possible.

Health in the Antarctic.

Health-Notes in the Antarctic were made by A. Forbes MacKay,[8] who accompanied Shackelton on his Antarctic expedition. In the fourteen months of the expedition the health of the party of 15 was nearly perfect. No colds, coughs, scurvy, anemia, zymotic diseases or rheumatism occurred. Dyspepsia troubled some members during the winter, largely due to little exercise and large appetites. There was no depression of spirits and every one was busy, scientific work being carried on during the winter as well as the summer months.

Frost-bites occur at any temperature below 20°F, especially if the clothes are wet, a breeze is blowing or the subject is hungry or exhausted. This ranges from an erythema, through vesication, destruction of cuticle and whole skin. But one severe frost-bite occurred, which came on quite slowly and painlessly, but recovery was excruciatingly painful.

Snow-blindness was largely prevented by goggles designed by Dr. Marshall. They are always troublesome and the tendency to avoid using them brings on the trouble. It did not prove true that foggy weather on snow

(8) Edinburgh Med. Journ., March, 1910.

plains was worse than any other, though it is often claimed that it is so. Treatment with zinc sulphate and cocain is the best.

Badly chapped lips afforded the greatest difficulty encountered. Little could be done to help this, except the use of lanolin and tying a bandage over the lower lip into the angles of the mouth keep the lips from sticking and to retain the ointment in place.

Food for the Antarctic should be as fatty as possible; 60 per cent. is not too much.

The Tropics and Tropical Diseases.

The Conquest of the Tropics for the White Race is described by W. C. Gorgas[9] in his presidential address before the American Medical Association. He outlines the sanitary work at Panama as it bears on malaria and shows how the measures employed may be applied elsewhere.

The particular mosquito that carries the infection is the center of all effort. The eggs are laid on water, a hundred at a time. These float about until hatched by the heat of the sun. The young have a larval and pupa stage of about eight days, when they become full grown mosquitoes. Clear fresh water abounding in grass and algæ is sought for by the mosquito, since this gives protection and food for the young. At the same time there must be brush and grass nearby for the adults to protect themselves from wind, for they do not fly much over 100 yards from their breeding-places. Consequently all breeding-places within a hundred yards of the locality to be protected are destroyed by drainage with ditches or subsoil tile; the latter is the ideal method. If open ditches are used they must be lined with concrete, owing to the rapid growth of tropical vegetation.

If drainage cannot be used as in a lake or large swamp, the brush and grass are cut along the border; if possible sulphate of copper is used in the water, if not, crude petroleum or phinotas oil are efficient. The former spreads over the surface and suffocates the larvæ that must live in shallow water; the latter directly poisons them. The author considers brush-cutting only second in importance to drainage as an antimalarial measure. A cleared space

(9) Med. Rec., June 19, 1909.

of 100 or more yards will stop the flight of the female mosquito. If brush and grass are continuous she may wander a mile or more from the breeding-place. Success in this work is largely dependent on the knowledge of the mosquito habits. Great results in getting rid of mosquitoes sometimes follow apparently inadequate means.

Colon with 15,000 people, is built on an island just above sea-level, where the ground is not filled. The houses are built on piles 2 to 4 feet high, and approached by raised footwalks. Heavy rains in the wet season make all this practically a fresh-water swamp, and mosquitoes are abundant. For half a mile back from the town the brush was cut away. This area was then intersected by several small canals 20 feet wide by 6 deep, and all the swamp connected by surface ditches to these canals. This allowed the fresh water to run off and the ditches were filled with sea water daily. Every water barrel and cistern was most carefully looked after. These measures, it was hoped, would get rid of the *Stegomyia* and *Anopheles* mosquitoes, which carry the malarial organisms, and fly but a short distance. The strong-winged *Culex,* a harmless species, it was not hoped to influence.

In addition all houses of employees were wire-screened. Most houses open upon long galleries, which are screened rather than the doors and windows, so as to reduce the number of openings. The use of the mosquito-bar is urged on the people, also the taking of 3 grains of quinin daily is recommended.

To carry out these measures the 45 miles of country along the canal was divided into 17 districts, each in charge of an inspector. In the office of the chief there were 3 men, an expert on mosquitoes, another on tiling and ditching, and a general inspector. These men are the instructors for the district inspectors. Each of these has charge of 25 or 30 men for ditching and brush cutting, carpenters for repairing screens, and one or two quinin dispensers who daily visit the camps and barracks and offer quinin to all that care to take it. The medical officer in each district reports weekly on the number of employees suffering from malaria. In the central office the ratio of cases to population of each district is ascertained and a record made to show the rise or fall of the rate. The work

of the district inspector is judged by this report. If the malarial rate rises in any district the special inspectors are expected to find the cause and correct it.

At Panama the results are most satisfactory. In five years the rate of cases per 1,000 has fallen from a maximum of 831 to 282 per thousand. The death rate is only 1.34 per thousand. Among government employees the general death rate has fallen from a maximum of 41.37 in 1906, to 13.01 in 1908; this is probably not higher than for a similar body of men in New York State.

In 1907 and 1908 the death rate among Americans in Panama was 6.73 and 9.72 per thousand respectively, not higher than in any healthy part of the United States. [It is to be remembered however that the Americans going to Panama represent rather a selected type. Weak individuals would naturally not attempt the life.—Ed.]

The author believes that the debility suffered by the white man in Panama and other tropical countries is due to malaria principally. Protection from this infection leaves them as vigorous and strong as in a temperate climate. The only difference between the present white population of Panama and that of former years is that to-day we are wholly protected from yellow fever and largely from malaria. The process is not expensive or difficult; a well-screened house, with all brush cut away for 100 yards is enough. In time the author believes that the construction of the Panama Canal will be remembered rather as the first demonstration that the white man can flourish in the tropics, than as a great feat of engineering or as a commercial triumph.

The Nation and the Tropics is the subject of an address before the Tropical School of Medicine in London by W. Osler.[1] Figures are given to show that the United Kingdom has a greater tropical area by six times than France, Germany and the United States put together, the latter ranking last. Of the problems concerning a subject nation, order and health stand first. The Anglo-Saxon is distinguished by the maintaining of the first; the 19th century is characterized by the introduction of the second through modern sanitation.

Infectious diseases are responsible for more than one-

(1) Lancet, Nov. 13, 1909.

half the deaths in the community. Now nearly all the diseases formerly overwhelming the temperate zones are under control or abolished, cholera, typhoid, tuberculosis, malaria, plague, smallpox, etc., cancer being the worst enemy not yet touched. Of tropical diseases the chief are malaria, plague, cholera, yellow fever, dysentery, beriberi, relapsing fever and certain parasitic disorders as ankylostomiasis. These vary in distribution, but are the great enemies of the tropics. Of all of these but one, the germs, conditions of growth, and in nearly all the propagation are known. Armed with accurate knowledge it took Gorgas and his staff nine months to clear Havana of yellow fever, a stronghold of the disease for centuries. In South America similar measures have been successful and one of the world's greatest plagues is in sight of extinction.

Control of the tropics is bound up with the problem of malaria. The efficiency of modern sanitary measures against this disease has recently been demonstrated in the Panama Canal Zone, one of the world's greatest death-traps. During the 23 years of the French efforts, fevers were their greatest obstacle. In September of one year the death rate rose to 176.97 per 1,000. Yellow fever, malaria and dysentery were the chief troubles. During this whole period 6,283 employees died in hospitals, thousands along the course of the canals, and many thousands returned home to die or were permanently injured in health.

In 1904 when the United States undertook to complete the canal the question of a successful issue was largely that of sanitation. Could the knowledge be made effective? Gorgas took charge. In 1904 and 1905 yellow fever recurred on the Isthmus. The cleaning of Panama, for centuries a pest-house, was alone a colossal task. During 1905 yellow fever was disposed of; at the end of it the white death rate was 8 per 1,000, the black still high, 44 per 1,000. Previously it was as high as 71 per 1,000, even in the American occupation. For 3 years with an increasing staff of above 40,000 of whom 12,000 were white, the death rate fell progressively. Plague reached the isthmus one year and was quickly checked. The most dreaded yellow fever has not been present for three years. Hookworm disease has decreased. Malaria, at all times the chief enemy, because of prolonged incapacity following the at-

tack, has been minimized. In 1906, 82 per cent. of the cases admitted to the hospitals were malarial; in 1907, 42 per cent.; in 1908, 28 per cent. This reduction occurred with a force of people one-third larger.

Dysentery caused 69 deaths in 1906, only 16 deaths in 1908 among 44,000 people. The most gratifying reduction was among the blacks, the death rate of which has fallen from 47 per 1,000 in 1906 to 12.76 in 1908. It is remarkable that in 1908 such tropical diseases as malaria, dysentery and beri-beri killed fewer than pneumonia and tuberculosis. Effective organization has conquered this great plague spot. In like manner Bruce and his colleagues have cleared Malta of Malta Fever.

In the last ten years some new diseases have been discovered, which open the field for further conquest. The trypanosomes and the dreaded sleeping-sickness involving some million of square miles, have been attacked vigorously with good effect. Plague has been the most dreaded scourge throughout history. Unnoticed for years, it began in 1894 at Hong Kong, appeared in 1906 in India and has reached 52 countries in every part of the world. In India there has been a constant annual increase. Until now there have been between 6,000,000 and 7,000,000 deaths in all. The disease has shown extraordinary tenacity in the face of vigorous measures. Although the virulence of the disease is appalling there is no reason to doubt the efficiency of the machinery that is keeping it in check throughout the world.

In all this work India most signally benefited. The health of the European has progressively improved, the gain during the past ten years being equivalent in the army to the addition of 2,000 men.

The author proposes a plan which would thoroughly organize and unify the present efforts in the study of tropical diseases. A central Tropical Institute should be composed of the present bureaus of plague, sleeping-sickness and malaria, with strongly affiliated schools. A staff of highly trained workers could be sent wherever a disease required investigating or a pest-hole was to be cleaned up. It has been demonstrated in the work on plague, Malta fever and sleeping-sickness that the disease must be studied where it prevails.

The schools of Tropical Medicine have been a great factor in the sanitation of the tropics. The Liverpool School under Donald Ross and Robert Boyce in its ten years of life has been exceptionally influential. The entire cost of all work done at home and on expeditions has been but $375,000.

Great organization is required to meet this problem. An Imperial Institute would represent the general staff of an army of sanitation. Each unit would represent one of Gorgas' seventeen divisions of the Panama Canal Zone and would take charge of an unsanitary district and leave it pest-free. The schools would be affiliated as training colleges for investigators and sanitary administrators. Each school should have six professorships, two of tropical medicine with a hospital of 200 beds, a good clinical laboratory and a system of graded associates and assistants; a professor of pathology with a separate institute, constructed like the new one at Leipsic; a professor of proto-zoology; one of helminthology; and one of Entomology; all of whom should have *carte blanche* for laboratories, museums and libraries. Subsidiary schools in the tropics, West Africa, Uganda and India would serve as centers for work. This would require less than $10,000,000, and would be money well invested.

Can the white man thrive in the tropics? Heretofore he never has had an even chance. Science has taught him how to be master, and time alone can answer the question, but sanitation and knowledge of the diseases are the key-note to the problem.

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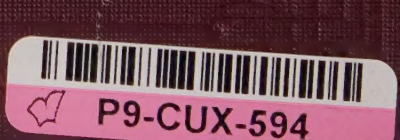
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